

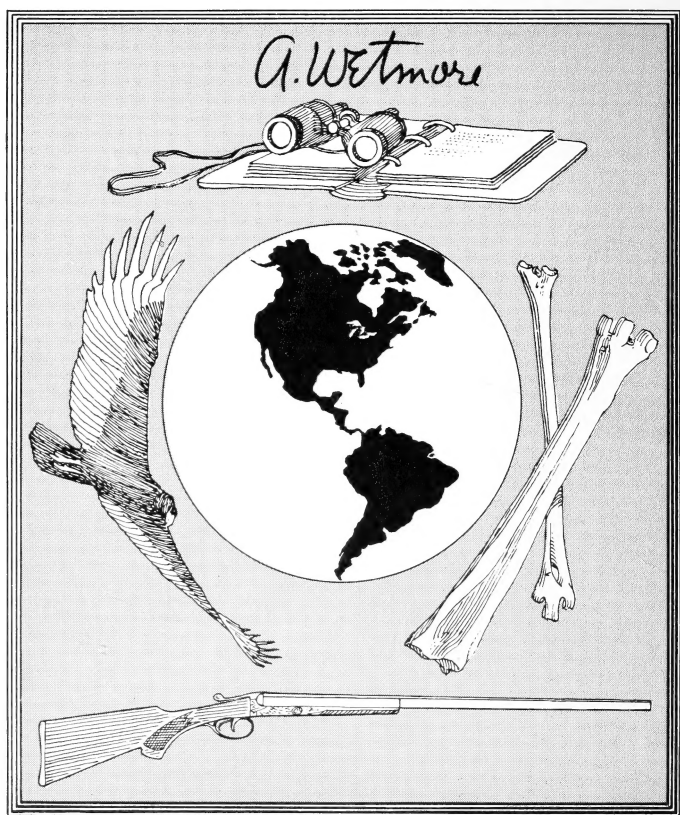
THE

NATURALIST'S

COMPANION

MERCER.

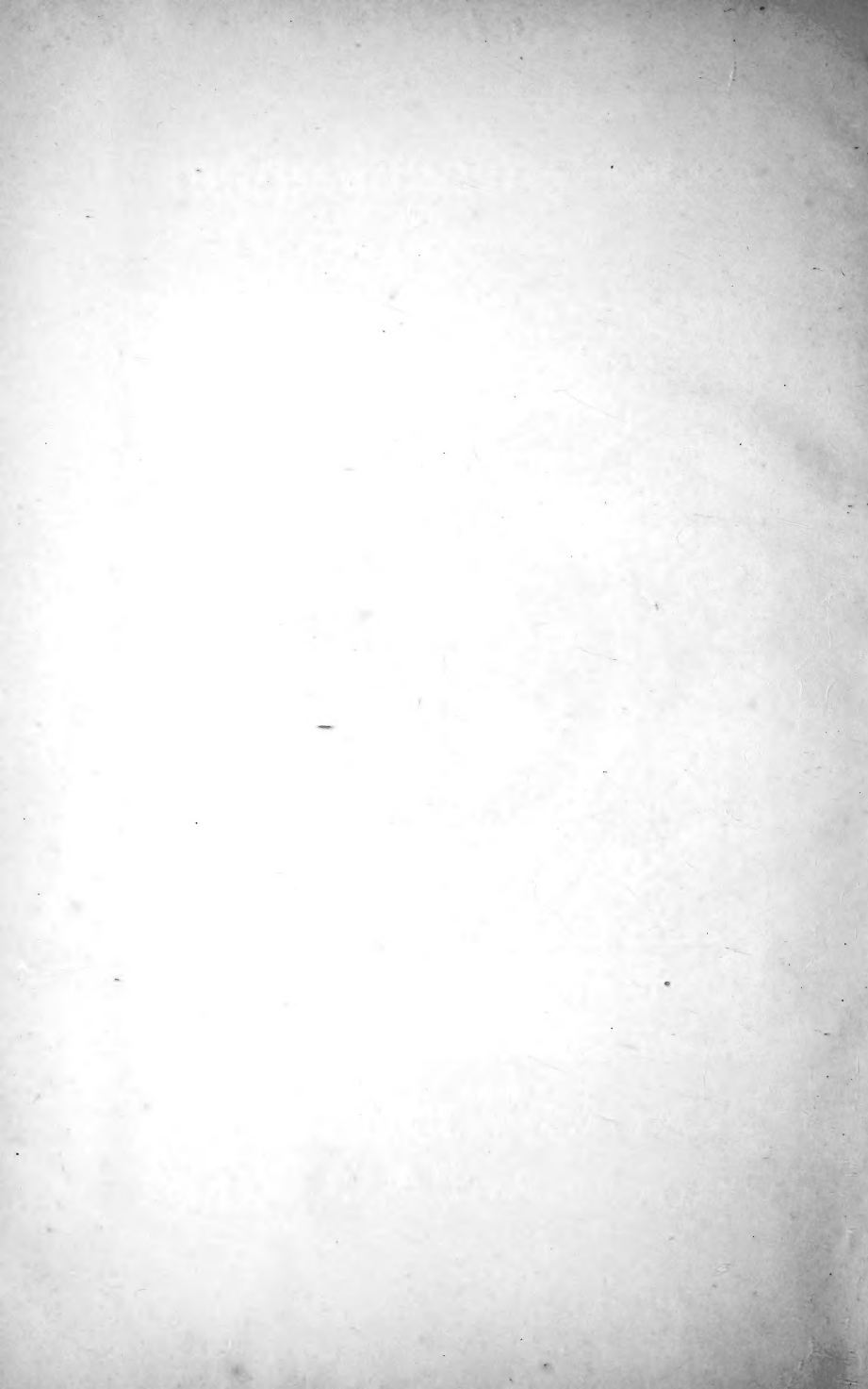
Smithsonian Institution
Libraries



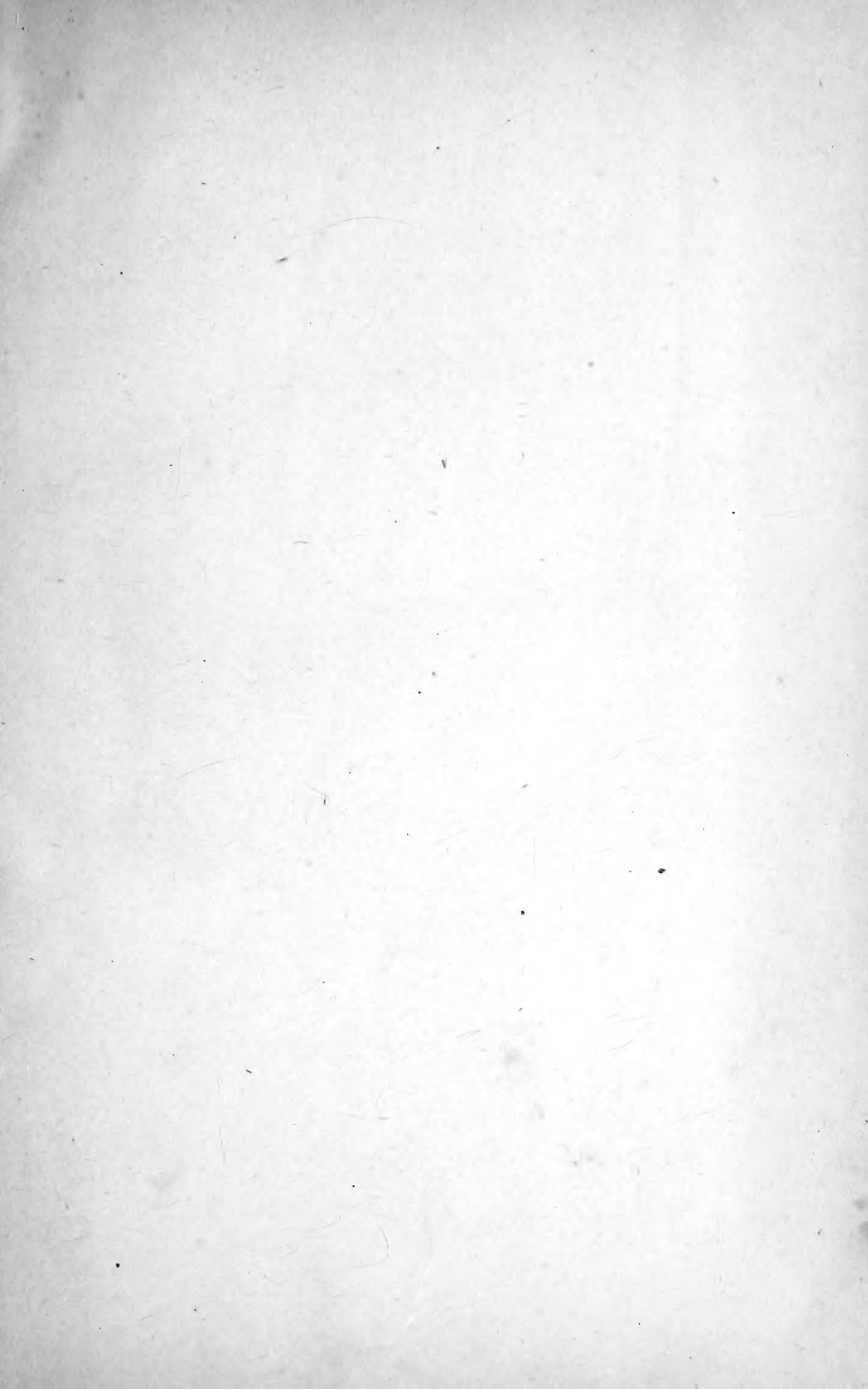
Alexander Wetmore
1946 Sixth Secretary 1953
&

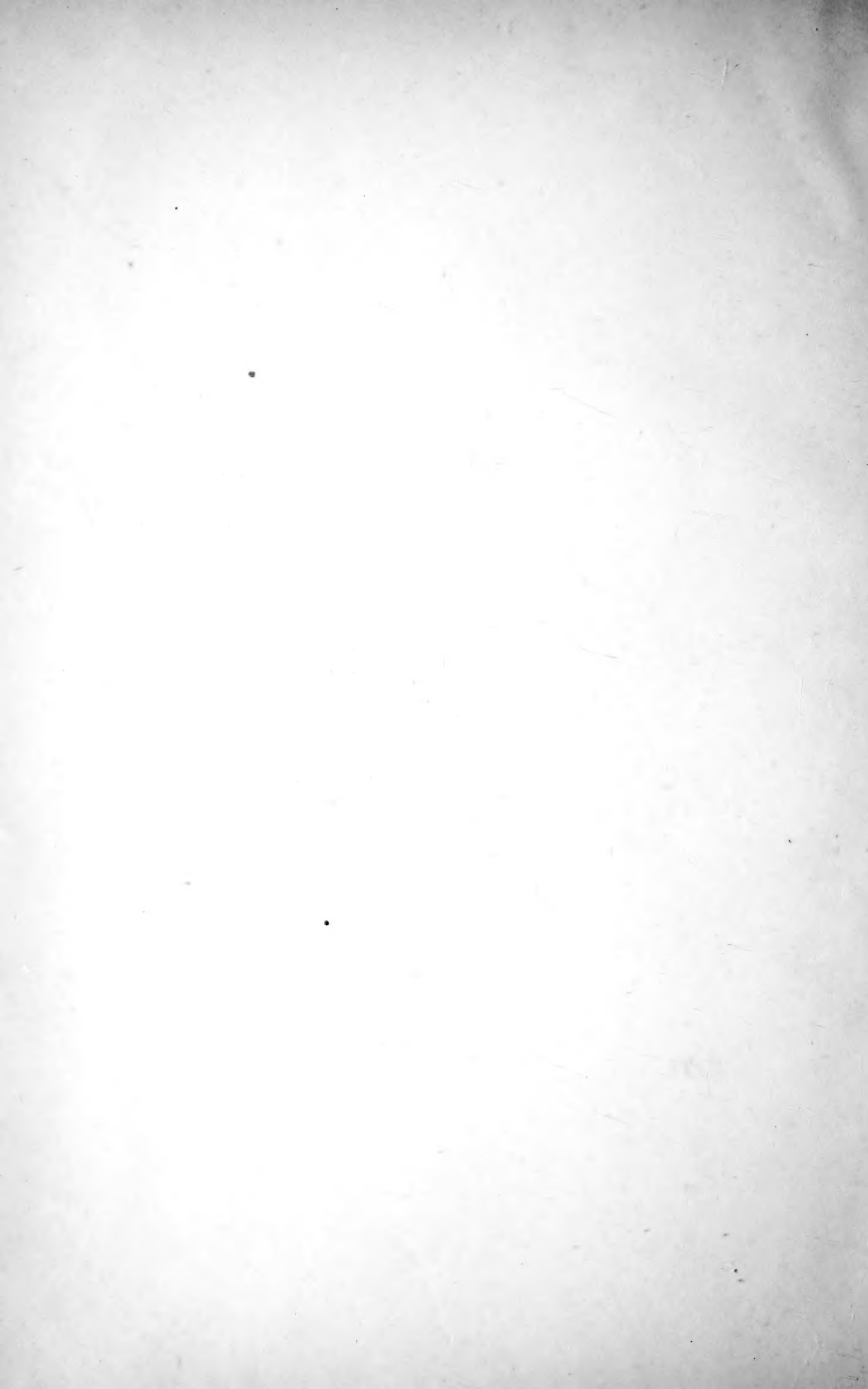
G. Wetmore

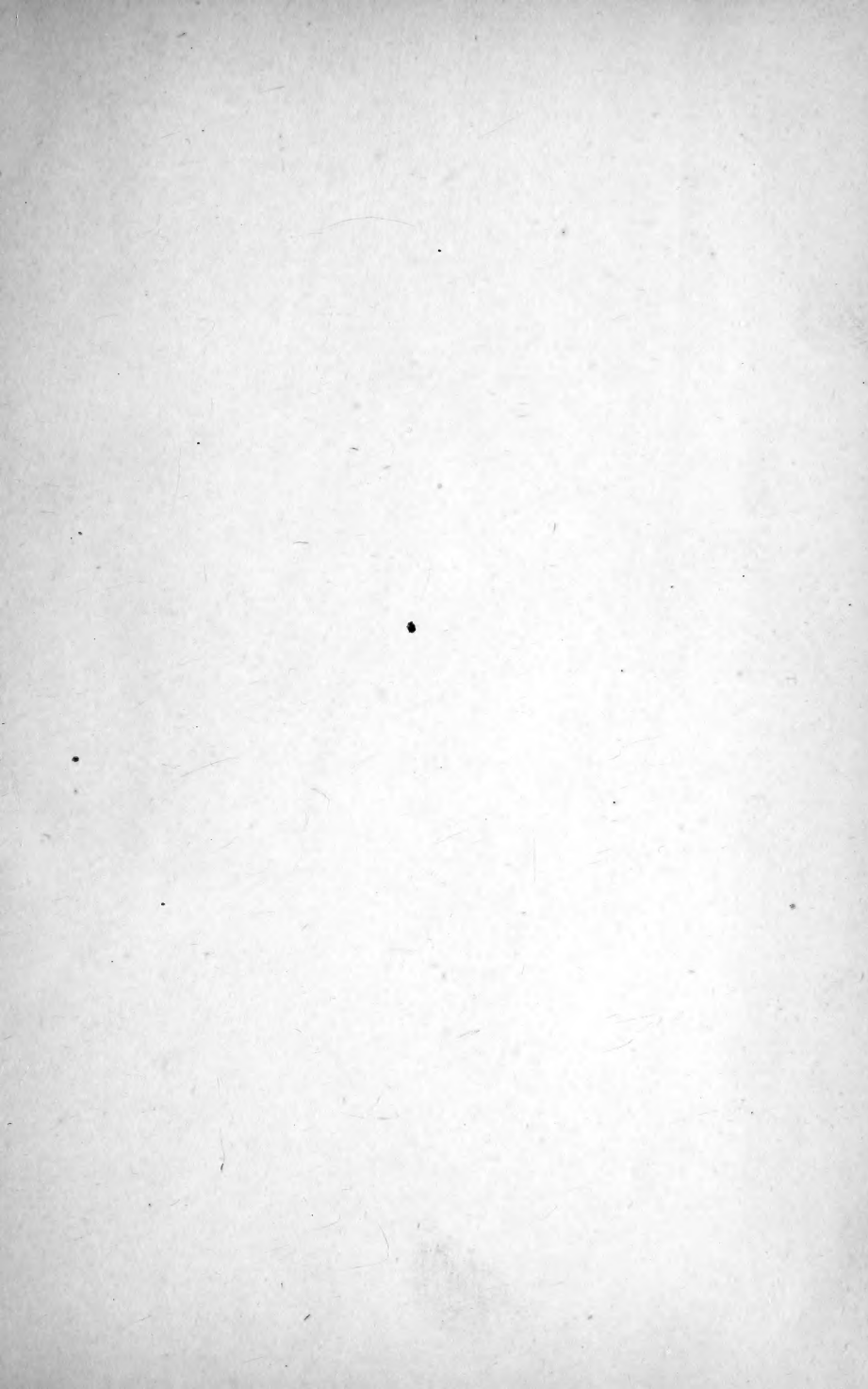
Z1

















QH
51
M55
NH

THE
Naturalist's Companion.

BY
Berton Mercer.



E. LAMBORN, PRINTER, EMPORIA, KANSAS.

—1889.—

Salutatory Essay.

NATURE.

Many moments which are spent in idleness might be usefully and profitably spent if you would listen to the calls of nature. There is much to be learned in this world beside that which we derive from books. Almost everything you see has its attractions for the lover of nature; the birds, the flowers, the insects, the animals, the trees, the world at large—all have their beauties and allurements.

There is nothing more refreshing, when one is tired of the noise and bustle of our universe, than to take a stroll into the fields or woods, and there watch nature in all her beauty. How interesting it is to observe the various specimens of birds, while they are engaged in searching for food, or are busily employed about their own household affairs. The great Creator of all things has bountifully provided for the birds and all other creatures which live upon the earth.

The flowers also, which grow in great beauty and abundance around us, would not have been made if they had not been intended for our enjoyment and admiration.

How eager are the botanists for the early flowers of spring! And the children, how diligently they search for the violets and other early representatives of the season. The flowers provide the butterflies and humming birds with a great portion of their food. How beautiful to see them poised in the air upon their rapidly revolving pinions in front of some choice blossom

sucking the juicy sweets from their delicate cups. And the insects, how curious the various changes which take place in the course of their lives: first, eggs; second, larvae; third, pupae, fourth and last, imago or perfect image of their parents. Most all insects make cucoons, and they must be guided or instructed by instinct to perform the various wonders which they do. The same in the case of migrating birds. How do they know when to go and where to go unless they be guided in some manner?

The higher ranks of the animal kingdom have a great degree of reasoning; and man which stands at the head of all is gifted with more than any of them if he only puts it to its right use, this being left for him to do or leave undone. How gloomy would this world be without the things above mentioned, and many more which have been omitted and are equally interesting.

If you want proof of this just take notice in winter, when most of the birds are gone, and the flowers, how we long for them to come back again, and look forward to the coming of spring with great joy. In winter it seems as though nature was dead. Notwithstanding this, if a careful observer go out on a ramble he is sure to find something to attract him, if it is but to examine the crystals on the snow, providing there be any. Many people pass through the world and scarcely know what it contains. I do not mean to say that every one should devote a large portion of time in this line, but I do mean to say that an interest in that way is not only very interesting but profitable. Some men do naught but study and observe in nature, and have written a great number of useful and instructive

books. But you can get more benefit and satisfaction from individual observation. How it fills one with joy and pleasure when he has found or seen something new.

I have read a great many books, but I like personal observation far better. When a person meditates upon the wonders around him, it has a great tendency to turn his mind unto the Author of all he enjoys, which should be the case, and doubtless was intended to be so. On the other hand, some people are so exercised about things of this kind that they grow wild. In one case, a man whom I knew became an infidel.

Nature was wonderful in the beginning, and will remain so until the end of time. The great ocean and all that is contained under its waves, the sky above with all its stars, planets and comets are wonderful. The earth with all its hidden treasures affords a wide expanse for our study. How wonderful are the many minerals and metals which we find—gold, silver, copper, iron, lead, and a great many other substances, all of which are useful.

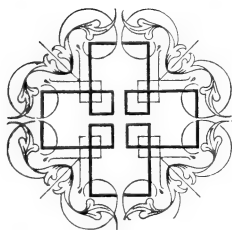
A place for everything and everything in its place is the motto by which the rules of nature are governed. Birds belonging to the tropics are not found out of the place assigned to them, neither is anything else found out of its place. If we would govern ourselves in this way it would be well.

Although there are such great numbers of birds, insects, plants and minerals there are no two alike. There is much more that could be said upon this interesting subject, but enough has been said to illustrate the pleasure there is to be obtained by a communion with all natural objects, so I conclude.

Nature is the loon of life,
To every one a guide,
To all those who nourish her,
And in her bliss abide.

Nature is the Master's look,
The companion of all our days,
She illustrates His handiwork;
She showeth forth His praise.

The blooming kingdom of the flowers,
The feathered minstrels of the air,
All proclaim sweet peace and joy;
All the contentment of nature declare.



PREFACE.

Although there have been many writings based upon Natural History and the various branches of the great natural world, yet the author of these pages feels at liberty to pen down a few thoughts and observations upon this interesting subject. The work will not be confined to any systematic order or grouping, but will be written in a simple way, just as it presents itself to the mind of one who has a strong love for nature in all her forms and appearances. Without attempting to do justice to the many creatures or objects which surround us, the author has endeavored to write an interesting treatise upon those things which an observant person sees when rambling for pleasure or profit. The main object in presenting this is a desire to relate more fully the habits, food and songs of our common eastern birds, especially those which we see in our roving through the woods or over the upland and meadow. Many of the writings now before us are inclined to slight to some extent our home pets, and rove away to distant lands, to describe their inhabitants. Without the least feeling of criticism toward our brave naturalists who have handed down so many valuable works, I will endeavor to give a short historical sketch of a few of them, not including foreign species of any class. This is not because I lack interest in the many creatures of the other countries of the world, but because my attention and interest are extended to those which are near at hand first, and if the time should ever come in which there ap-

pears to be nothing more to learn among them, then will be the time to go abroad and notice those of other countries. But that time will never come, for a whole life time would come far short of being sufficient length to learn all that can be learned in the things around us. The most learned men always find new and unknown things nearly every day of their lives.

Our native land exhibits a broad field for study and improvement. Who is able to exhaust all that can be found, or who knows everything in connection with them?

Besides the brief history of birds, this little volume is extended to insects, animals and flowers, each of which have a division to themselves. Flowers as a general thing are described in Botany, but as this work is not intended as a regular natural history, but rather as a Companion to the naturalist and lover of nature, they will be included in it. A number of our summer species are here botanically analyzed, with all the parts given, together with their families and scientific names. Insects will be treated as we see them in their homes, and about their many vocations: I say vocations, for they as well as man have their employments, and are happy in the station assigned to them.

The study of natural history is very profitable in many ways: first, as giving farmers and gardeners instruction as to what creatures are injurious to him and those which are innocent, thus enabling him to detect the guilty and protect those which are harmless. It proves itself useful in other ways. Who is there but what when they see these beautiful children of nature are glad to know and learn all about them, and not

look upon them as entire strangers whom we do not know or care to know. In reality there is no branch of the natural kingdom which is more attractive than any other, for they all have their individual wonders and interesting features. Animals will be described in a limited way, without undertaking to embrace the quarter of those upon the earth. Some histories and anecdotes connected with them will be given. These four divisions of creatures form the first part of this book, while the last part is confined to those things of interest and beauty which we find over the land that are without life. The first divisions of this class include Natural Phenomenas and changes, such as Earthquakes, Volcanoes, Halos, Rainbows, and a number of other occurrences, which when studied from their foundation are truly wonderful beyond description. Rocks and minerals are treated upon to a certain extent, also the interior of the earth, and the many formations and changes which have at various periods transpired. The divisions of the Geological time are given, and the ages which belong to them. The creatures which lived at the different periods, and their appearances, will be alluded to. To enliven this work, scattered along among its various subjects are short pieces of poetry in reference to what has been described before them. Most of these are composed by the author, while a few are gleaned from the works of distinguished poets.

Much time, labor and care has been given to make this little book attractive and interesting to the Naturalist and the public generally. It is in particular written as a friend and companion to those whose delight it is to stray away from the many cares which

surround us, and hold communion with nature in her wild grandure, just what a little child would like when on a happy ramble over the country where so many strange objects present themselves, and it serves to some degree to answer their many questions and satisfy their curiosity. The author does not mean to say that he has attained any great amount of knowledge, but through an ardent interest in nature, has written these lines. Hoping it will be deemed worthy of associating with other volumes I close my remarks.

BERTON MERCER.



PART I.

INTRODUCTION TO BIRDS.

Birds are one of the most interesting kingdoms of the earth. They are divided into many classes, according to their food, habits, dwelling place and plumage, some of which are rare and gorgeous, surpassing the vain attempts of man by his knowledge to a wonderful extent. The body of most birds is boat-shaped in order to render their progress through the air more easy and rapid, their bones are hollow, serving to make their frame-work light. All birds are bountifully provided. Some which have no wings are endowed with great swiftness of limb, and others which are apparently deficient in one respect are provided for in another.

It was from the bird's body that man obtained the idea of shaping his boat, and we are indebted to them in many ways which are scarcely ever thought of.

The different birds of the world have their own locality and mode of feeding, and their habits change not, but the way in which they were first created and the instinct of each which was then given them ever remains the same.

Birds of prey—hawks, eagles and owls—are very large and strong. They are fitted with beak and claws in accordance with the life they lead, which is the capturing and tearing to pieces of smaller birds and animals for food. The whole race, from the huge condor of the lofty mountains, to the minute hummer of the

tropics, are very interesting and deserve our attention and admiration, and they have received it from a great number of persons who love to look upon and study them. Such were Audubon and Wilson, who devoted the greater portion of their lives to this work and have turned out valuable works.

The poets make frequent mention of nature. Many beautiful poems may be found concerning birds, either as a race, or individually.

There are thousands of birds scattered over the earth and many have gorgeous plumage, and voices of sweet melody.

The bible makes frequent mention of birds, and the names of some are often found upon its pages. How interesting are the circumstances there related which describe them. How the ravens fed the prophet Elijah in the valley, and the flocks of quails came from the sea and saved the Israelites from perishing with hunger.

Birds hold a charm for every one who loves them, and are sure to give you pleasure, and repay you for having studied them. A few will be mentioned and described in the following pages of this work.



AMERICAN ROBIN.

(Merula Migratoria.)

This bird is a member of the thrush family, and is one of our earliest spring visitors. It is always welcome, with many good wishes. Its clear, sweet notes may be heard on cold, wet days, when there are scarcely any other birds around. Plumage simple, as follows: the head and tail black, back and wings drab, and the breast a brick red. They are great fruit thieves, but are considered by most naturalists to do more good than harm. They rear two broods in a season, the second set of eggs hatch about cherry time. The nests are very common, being placed in trees and bushes, and are chiefly composed of dry grass and mud lined with finer material of the same kind. Eggs four of a rich bluish green color.

WOOD THRUSH.

(Hylocichla Mustelina.)

Of all the beautiful songsters this is one of the chief. In early spring and summer the woodlands are made to resound with the clear melodious notes which he keeps pouring forth by the hour. In size it is about the same as the robin. Plumage dull reddish brown on back, tail and wings; the breast white, thickly covered with triangular black spots. Species very common in woods and groves. Nest placed in a low tree, generally a beech: it is composed of mud, grass and beech leaves (dead ones) which make it conspicuous, they being so white. Eggs four, same color as the robin, size a little smaller.

CAT BIRD.

(*Galeoscoptes Carolinensis.*)

Another member of the thrush family is this saucy fellow, and also first cousin to the mocking bird of the South. Arrives in this section about the first of Fifth month (May), and stays with us all summer. In early spring its song is beautiful, but in autumn it turns to a shrill harsh cry somewhat resembling that of a cat—hence the name. They are common throughout the entire country. Plumage bluish drab, with the exception of a patch upon the head, and the tail, which are black. In song it can imitate many different notes, and for this reason is called the Northern Mockingbird. Nest placed in low bushy or briery places, composed of coarse sticks lined with grass and leaves, shallow. Eggs four, oval, rich blue.

MOCKING-BIRD.

(*Mimus Polyglottus.*)

Although this thrush lives in the South and is not often seen by northerners, yet it claims our attention. For mimicry there are none that can match it, for it can imitate the notes of all birds from the largest to the smallest. It is said that this bird has often caused small birds to hide by uttering the sharp cry of a hawk or owl. This bird is a great friend of man and delights to make its abode near his home. Plumage a general ash or drab with a little black; tail long. Nest placed in large bushes or trees near a house. Eggs four or five in number, ashy or gray mixture in color, rather small.

GREEN CRESTED FLY-CATCHER.

(*Empidonax Pusillus.*)

This member of the fly-catcher family is very small and quite rare. Seldom do we see it. The color is dark with a beautiful green crest which can be raised or lowered at pleasure, this being a reliable characteristic of this family of birds. Arriving in early summer this little fellow betakes himself to deep woods or wild places where he busily engages his spare moments in capturing flies and other insects which chance to be passing near him. The nest of this species is generally placed in the forks of a low limb of a beech tree, some six or seven feet from the ground: they are mostly composed of dried chestnut blossoms which they gather and throw together in a loose manner. Eggs four or five are of a handsome rich cream color slightly spotted with brown on the larger end.

PINE FINCH.

(*Pinicola Enucleator*.)

This variety of birds are not to be seen often during summer, but appear in small flocks during early fall, and may be seen sitting on the tops and branches of pine trees, feeding upon the seeds which they get from the cones: these they extricate with great ease and devour with avidity, all the while uttering a pleasant warbling song. When one goes they all go, and fly somewhat like the gold finch or yellow bird. They soon alight, however, and commence feeding on another tree. The color of the males is rich crimson, with a variety of black and white on the wings and tail: the females are dull brown and white with a little red tinge.

GOLDEN CROWNED THRUSH.

(*Siurus Auricapillus.*)

This bird is rare, and also shy, hiding in the thick woods and shrubbery. It is not very large, being from four to six inches long, the color is a rich brown with some variation, the crown of the head a yellow color, from whence it derives its name. When surprised it escapes into the leaves and underbrush with the celerity of a mouse and is not easily detected. It is mostly a ground bird and delights in walking over and among the leaves in search for its food. The song is simple and subject to much variation, being on an undulating scale; so that little idea is obtained by listening, as to the songster's position. The nest is a hollow in the ground made oven-shaped, well lined in the interior, and excellently concealed on the outside with leaves, so that it is very hard to discover. The eggs are five in number, of a light blue color, sparingly spotted, they measure about .88 by .66 of an inch. It is occasionally called oven bird.

SNOWY OWL.

(*Nyctea Scandiaca.*)

We now have another specimen before us that we do not see during summer, but it appears in the United States during the First and Second months; during the other periods he lives in the far north among the ice and snow. He is large and beautiful, being of a snowy white color and very powerful. His prey consists of small animals which he gets with ease. A nest was found near West Chester, Pa. during the Second month, 1885, which contained two large white eggs. The old bird was then sitting.

WHITE EYED VIREO.

(*Vireo Noveboracensis.*)

The white eyed vireo is not so abundant as the vireo olivaceous. It arrives generally about the first week in May. It first confines its revellings to high open woodlands, where among the branches high and low it gleans a ready sustenance. Later in the season it is an occasional denizen of cultivated fields and orchards, where its presence is made known by its loud and peculiar song: besides the above places, it occupies wild pastures and woodlands, where there are numbers of brier patches, undergrowth and ivy, where it delights to hang its beautiful pencil nest. This vireo is one of our chief songsters. Its notes are louder and clearer than most of our eastern species, and it has great variation and melody. Beetles and worms form its chief food, thus riding vegetation of much destructive vermine. Nesting commences the latter part of May and requires a period of time varying from four to six days. Eggs are four in number, oval oblong, of a crystal white, spotted with brown and lilac on the larger end. Nest suspended from a low brier or bush: it is composed of fine inner bark of grape vine, moss fibers and grass: it is a neat cup or cradle, and the materials are finely woven together, forming compact walls. The family of vireos are extensive and numerous, nearly all of which are sweet singers and beautifully clothed in various shades of metallic bronze green, white and brown. The nests are all neatly made, and much resemble each other in appearance and locality.

COMMON SHRIKE.

(Lanius Ludovicianus.)

In size this bird somewhat resembles the robin, the color is bluish with black upon the wings and tail, also a patch under each eye. He derives his name from the habit he has of impaling his food upon the thorns or other sharp points. The food consists of small birds and mice, and a great number are killed and hung up which are never eaten. When hungry he immitates the cry of some small bird, which brings them to the spot, when they are pounced upon and destroyed. It ranks among the song birds, but is a hawk in disposition. It builds a large nest in the forks of a tree, often in the orchard. It is composed of sticks and grass. Eggs four or five, of a dull olive cast.

L. B. MARSH WREN.

(Telmatodytes Palustus.)

This interesting bird arrives in Pennsylvania in the early part of May, or as soon as the reeds and splatter docks appear along the shores of our lakes and rivers, and are sufficiently large to shield it from view. Its food consists of flying insects and their larvæ; also a species of green grass-hopper which inhabits the reeds. Its song is peculiar, somewhat resembling the noise made by bubbles rising through water. The nest of this little specie excells many others in structure and design: it is placed in the thickest part of the reeds, and is composed of them: the general shape is round with the hole in the side for an entrance. The eggs are numerous, of a mahogany color, thickly sprinkled over the entire surface: they vary much.

KING-BIRD.

(*Tryannus Carolinensis.*)

We have now arrived at the monarch of birds, which indeed he is, being able to put the largest birds to flight, even bossing the eagle when he chances to meet one. When any large bird, such as a crow or hawk comes near to his nest or dwelling place he mounts up into the air and commences a severe and pugilistic attack by a series of sharp pecks upon the head of his enemy, which is always driven away by his small antagonist. The king-bird belongs to the fly-catcher family, and is very expert in the business, flying through the air and catching them on the wing. The bill is covered with a number of short thick bristles, which entangles his prey. The plumage above is black, and below a dull white: upon the head is a crest of orange, red and vermillion, but it is never seen except when raised. The nest is placed in orchard trees generally, composed of coarse material. Eggs, four or five, cream color, spotted with rich brown and lilac.

GREAT CRESTED FLY-CATCHER.

(*Myiarchus Crinitus.*)

As the name indicates, the chief feature of this bird is the crest which it bears. The plumage is dull brown, and the only song is a sharp whistle which it utters repeatedly. It may often be seen among the topmost branches of the evergreen trees in search of flies and other insects which it catches with great dexterity. The nest is placed in trees, and occasionally in fence corners. Eggs yellowish, beautifully streaked with brown.

RUBY-THROATED HUMMING BIRD.

(Trochilus Colubris.)

This is the only member of the humming bird family that makes its abode in this part of America, all the rest being confined to the tropical regions of the new world, while the old world is supplied by the sun-bird, which is a very beautiful species. Our little hummer is a perfect gem. Arriving by the first of summer, it stays with us until early autumn, or until the flowers and insects upon which it feeds are gone. The general color of this bird is a beautiful metallic green, with a handsome ruby throat, which is changeable. The female is light underneath, and is minus of the red throat. When angry or excited they utter a sharp chirping sound. There is a great amount of pleasure to be derived by watching this beautiful little fairy, taking honey and insects from flowers while suspended in the air. Very often they alight on some near object by the house, when you have a good opportunity to study their tiny form. It will bear being looked at, provided the observer keeps at a reasonable distance. Sometimes this species can be tamed, if good care and patience are exercised in doing it. The nest of this bird is very attractive, being composed of fine, soft material like wool or down, and covered with the lichens from trees and fences, which make the little cup resemble an old knot on the limb, and it is often mistaken for such. The opening of the nest is scarcely larger than a quarter dollar, and is very cute in appearance. The eggs, two in number, are white, and scarcely larger than peas.

PEWEE FLY-CATCHER.

(*Sayornis Nigricans*)

Our spring is early greeted by this plain, unpretending little bird. It is one of the smaller birds of the family, being about as large as the common sparrow, except that the tail is longer and the head is crested. Its plumage is very dark or nearly black above, and slaty white below, bill and feet black. It is a very pleasing and amusing sight to see this bird sitting on the fence or a tree by the hour and flying every few minutes at an insect which it generally secures and returns to its post by a circular flight. When taking an insect a sharp snapping of the bill is heard. Its song is very simple but pleasing. It builds its nest under old bridges, unoccupied buildings or about the barn: it is composed of mud, feathers and some other soft materials. The eggs are small, somewhat pointed and pure white: there are from four to five.

WOOD PEWEE.

(*Contopus Virens.*)

This species of pewee is not so often seen as the former. Its home is in or around the woods; sometimes in an orchard. The general color of this bird is dark brown or greenish above, and a yellowish white beneath. It is generally to be found as early as the Fifth month in our latitude, and proceeds north as far as New England, being found in the eastern United States. There is a western species also. Our bird delights in the deep, thick forest. The nest is small and made of soft materials, and is saddled to some horizontal limb so as to appear as part of it. Eggs rich cream color, spotted with bright brown, four in number.

CHIMNEY SWIFT.

(*Choetura Pelagica.*)

There is hardly anything which is more common, or seen oftener in summer than this member of the swallow family. It is here in early spring and may be seen in little companies flying around in circular evolutions, catching insects, at which they are very expert, all the while uttering their short, pleasant twitter. In the evening they gather in groups around the mouth of the chimney, and, flying around it rapidly, a few tumble in at a time until all are safely lodged within its walls. The plumage of this swallow is dusky. The nest is placed in chimneys, being fastened to the walls and the parents and young there live amid the smoke and heat. Before chimneys were so common these birds built their nests in hollow trees. Eggs, four to six, oval, about half an inch long, color dingy white.

WHIP-POOR-WILL.

(*Caprimulgus Vociferus.*)

This bird may be seen to best advantage in summer evenings, when it flies in circles and evolutions high in the sky, uttering its harsh note, ever and anon making a deep dive or curve in the air. The general color is black with white bands and marks. The wings are long and pointed. There are a number of stiff bristles around the mouth. The Indians call this bird the Wish-ton-wish, and regard its notes as answers to some of their superstitious ideas. This bird makes no nest, but lays its eggs on the ground or a large rock. They are a grayish color, spotted with lilac or brown. Closely related to this bird is the Night Hawk, (*Chordeiles Popetue*), but is a separate species, as decided by our naturalists.

DOWNY WOODPECKER.

(*Picus Pubescens.*)

Early in spring this little feathered friend returns to us and makes his presence known by rapping on the trunks of trees and uttering its little ditty, which is not very attractive, but pleasant to those who love nature and her children. The plumage of this bird is a varied mixture of blue, black and white, which makes it very pretty. It much resembles the Nuthatch in every particular. The nest is placed in a hollow tree, mostly a dead one. Occasionally they bore a hole in a green one. Nest made of chips and bark fibers. Eggs number from four to six. They are a beautiful white, spotted with brown.

RED-HEADED WOODPECKER.

(*Melanerpes Erythrocephalus.*)

Any one who has lived in the country can scarcely escape seeing this beautiful bird. In early spring and summer it may be seen flying from tree to tree, and on telegraph poles, where it shows to good advantage. The head and neck are a bright scarlet; the points of the wings and rumps are black; the rest of the body white, making it a very showy bird. It has a loud, harsh cry, often when tapping trees for insects. The nest is made in hollow trees, as are those of all woodpeckers. The eggs number from four to six. They are a pearly porcelain white, as shiny as glass, somewhat pointed. The eggs of most all woodpackers are pure white, except the Nuthatch and hairy sap suckers, which are spotted with brown. The red-head is sometimes shot for food and cabinet purposes.

YELLOW-BILLED CUCKOO.

(*Coccyzus Americanus*.)

This curious bird does not arrive as soon as many of our feathered friends, summer being well advanced before it makes its appearance. The plumage is olive green above and white below, with a little brown mixed in on the wings and tail. The bill is long and curved: the tail is also long; the bird in general being long and rather slim. Its note sounds something like the syllables *cow-cow*, repeated several times. It is generally shy, concealing itself among the thick foliage of the trees. The nest is placed in a tall bush, about fifteen feet from the ground, and is composed of sticks loosely thrown together. Eggs are two in number, of a light green tint, about an inch long, and are chalky in structure. The black-billed Cuckoo (*Coccyzus Erythrophthalmus*), is not as common a specie.

SCREECH OWL.

(*Scops Asio*.)

The note of this bird is more of a plaintive melody than a screech. When the trees are bare, and wintry winds are blowing, the note of this bird makes the hearer feel rather sad: it sounds like a mournful lament over some misfortune. The plumage is a mottled brown and white; the bill and feet are strong and thick, the eyes are surrounded by disks, as is the case with all owls. The nest is placed in a hollow tree, and is composed of bits of bones and feathers which it disgorges after eating. The eggs are four in number, white, and nearly round. This bird is not heard in the summer season.

HIGH-HOLE FLICKER.

(*Colaptes Auratus.*)

Spring has scarcely a more hardy or an earlier visitor than this bird. Before the leaves are upon the trees, and before anything has awakened much from winter's sleep, this brave and active member of the woodpecker family may be seen on the highest tree-tops, tapping them and uttering his loud notes, so familiar to all. The plumage is brownish black above, and yellow beneath, with a large black crescent in front. It has a red patch near the tail, also a white one which shows very plainly when flying. This species often comes to the ground and searches among the leaves for food. Its nest is placed in a hole in the trunk of a forest tree, well up. Eggs number from four to six, pure white, and nearly round. These birds are sought for food.

BELTED KINGFISHER.

(*Ceryle Alcyon.*)

We now have before us one of our most beautiful water birds. It arrives in early spring, and may be seen flying along the banks of streams or over large ponds. Its plumage is blue, green and white, intermixed and barred. It has a grand belt from which it gets its name. The bill is very large and strong, being adapted to the purpose of fishing, by which it lives. Sitting on a stake or tree near the water it watches closely for its prey, and when it sees a fish it darts into the water and secures it. Nest is placed in a deep hole in the bank of a stream, a little hay or straw being used. Eggs, four or five, white, and nearly round.

SPAORRW HAWK.

(*Tinnunculus Sparverius.*)

This little hawk is the smallest of the family, besides the above name it is sometimes called the merlin or kestrel. Plumage a varied mixture of brown, ash and white, the upper parts being dark. The head is small and roundish, eyes keen-sighted, tail long and wings pointed. Its general foods are small birds and mice, which it catches with great dexterity. Sitting on some favorite perch where it can command a large area, it suddenly darts down and seizes its unsuspecting prey with great ease. If it be a bird the rest of the flock retreat in a speedy manner, and without order. This bird has a harsh whistling cry which is more frequently heard during the mating season. The nest is placed in a hollow tree and sometimes in the branches high up, occasionally a deserted crow's nest is used or a woodpecker's former abode, the same nesting place is used several years in succession. The eggs number from three to five, roundish, color reddish brown, the groundwork being light, the markings are so heavy and numerous as to almost obscure it. When the young are hatched the parents accompanying them fly around together and sit in one place for hours at a time, the old ones occasionally securing some food. When pressed by hunger or in close pursuit of game this bird will come close to our dwellings, it has been known to go through a window in pursuit of its game when highly excited or extremely hungry.

BROWN THRUSH.

(*Harporhynchus Rufus.*)

This species, sometimes called the hedge thrush, is pretty common along the roadside and fields, where there are bushy places especially. It is a little larger than the robin, dark russet brown above and a bluish drab below, tail and bill long. No song in particular. This bird feeds on insects and berries which it finds in the woods. It builds its nest in hedge-rows and bushes, composed of sticks and rough material lined with grass. Eggs, four; the groundwork a light gray thickly freckled with brown.

BLUE-BIRD.

(*Sialia Sialis.*)

A member of the warbler family is this bright fellow. They return to us in early spring, sometimes as soon as the third month (March) appearing in large flocks and roving over the fields and meadows, picking the seeds out of last year's weeds and plants. They are a beautiful bright blue above, and have a chestnut red on the breast, also a little white underneath. They are very pretty singers, their note is a soft warble which we hear more frequently during the early part of the season. They often make their nest in a keg or some other convenient place around the dwelling of man. They also build in hollow trees and holes in posts and other places. Their nest is composed of the same material as the preceding species. Eggs, four; light blue uniform. They are smaller than the robin's, roundish oval.

RUBY CROWNED KINGLET.

(*Regulus Calendula.*)

This is a very small species, scarcely larger than a wren. The crown of the head a ruby color, the rest of the body is bluish, with a little black on the wings and tail. These birds are very common in early spring about blossom time, when you can see them hopping from limb to limb busily engaged in gathering all the insects and bugs it can find. All this while it utters a pleasant sweet little chatter somewhat like that of the wren. Later in the season these birds fly further north to breed. Of their nest and eggs little is known. It is thought to build in high trees. There is a golden crowned kinglet also, which is much the same in character as the other, except its golden crown.

BLACKCAPPED CHICKADEE.

(*Varus Atricapillus.*)

This species is called the titmouse and is a very saucy little chap. In spring it may be seen in company with many other kinds of its size. It is a very small bird. Plumage, head rich black, also tail and bill, the upper part of the body a bright blue and the under parts white, making him a very pretty little specimen. He has a very cheery and interesting note which he utters constantly. It is very common and often seen in spring, but later it retires to the woods. The nest is placed in hollow trees pretty well up, composed chiefly of sticks. Eggs, five or six, white ground spotted with brown on the larger end.

WHITE-BELLIED NUTHATCH.

(*Sitta Carolinensis*)

This is another common species, easily to be found in the woods. It is a member of the woodpecker tribe, and is about the size of a bluebird, white below, blue above, with some black on the head, wings and tail. It has no particular song, but has a note which it utters while rapping and hammering the trees in search of grubs and worms upon which it feeds. It received its name from the habit of placing hard shelled nuts in the fork of the limbs to crack them. It digs a hole in the solid wood to make its nest, and while engaged in doing so it carries the chips a distance to prevent suspicion. Eggs, from four to six in number, white, spotted with brown on larger end; spots few.

BROWN CREEPER.

(*Certhia Familiaris Rufa.*)

This is another member of the same tribe as the above. A little smaller than the Nuthatch, light below and dark brown above, somewhat striped and variegated, bill long and curved, feet adapted to climbing and sticking to trees. It may be seen in spring and summer running up the trunks and branches of trees in search of insects, upon which it feeds. It is not gifted with any particular song. It builds its nest in hollow trees which is a characteristic of nearly all the woodpecker tribe, nest is composed of chips and other coarse grass or sticks. Eggs, seven in number, ashy gray in color, long oval. There are numerous other species of creepers, but they are not so common.

HOUSE WREN.

(*Troglodytes Aedon.*)

A brave pugnacious little bird is this one. He is one of our good singers and comes to us early in the year or bird season. This bird delights to live near man and it will build its nest almost any place where it can get room, in little boxes or houses, holes in walls or timber, large cracks or unoccupied garments that may be left hanging loosely about. The nest is composed of coarse sticks and lined with feathers. Eggs, six or seven in number, of a light reddish brown color freckled. Its plumage is a uniform russet brown. I have known this wren to chase the English sparrow out of a house and tear out all their nest and then take full possession. The wood wren is another species of somewhat the same description excepting the nest, which is placed on or near the ground. The eggs are a little larger and brighter colored, also a darker ring around the large end. The winter wren is not so common in this section, only to be seen in winter hopping about our buildings and wood piles and around over the snow-covered bushes. This species goes north in spring to their nesting grounds and summer home. The longbilled marsh wren is another very interesting species which lives in swampy or shore localities where they may be seen in great numbers flying hither and thither among the sedge grass and rushes. It is also skilled in architecture, making a fine little woven nest nearly globular in form with an entrance in the side with a small porch over it.

SCARLET TANAGER.

(*Pyrranga Rubra.*)

This is one of our most gorgeous American birds, which visits us in summer, arriving from the south about the middle of the sixth month (June) or earlier. Its head, wings and tail are jetty black, while the rest of its body is of the brightest crimson. The beauty of this bird can hardly be set forth by language. It and the great famed cardinal grosbeak are gorgeous, besides many others which we do not see. This bird mostly confines itself to the woods, but sometimes it makes itself familiar with man, and comes and builds near his residence. The nest somewhat resembles that of the black-bird and is generally placed in an apple or maple tree. Eggs, four or five in number, light green variously marked with dull brown.

CHIPPY SPARROW OR HAIR BIRD.

(*Spizella Domestica.*)

This is one of the smallest of sparrows, and is widely known by its familiarity and tameness, coming always to the dwellings of men, there to receive the crumbs which are thrown by them. In some cases they become very tame, so as nearly to eat out of your hand. Such is the case with us, having fed the parents and young for three years. They are very plain colored as all the sparrow tribe are, the breast drab and the back variously striped and marked with a brown patch upon the crown of its head, something like a prune seed. They delight to make their nest in the honeysuckles, composed of hair mostly. The eggs are small, four in number, green marked with brown.

FIELD SPARROW.

(*Spizella Pusilla.*)

This is a very common species of the sparrow tribe which we see every day and many times a day. It is larger than the chippy and has a beautiful striped breast. Its song is beautiful though simple. This happy little fellow makes his home in fields and meadows and along roadsides and makes his presence known by his note. His nest is placed in hedgerows, bushes and brush-heaps, composed chiefly of grass lined with hair. Eggs, four; light green, covered by mottled brown.

SAVANNAH SPARROW.

(*Passerculus Sandwichensis Savanna.*)

This is another species not so common. It inhabits barren fields and pasture lands. In habits, color and in general, it resembles the last. Its nest is placed upon the ground, and has four eggs. Song sparrow is nearly like the last.

SNOW BIRD.

(*Junco Oregonus.*)

This member of the sparrow family visits us in winter and is welcomed very much as so many of our other birds are gone on their tour down south. These birds come about the time the first snow falls and very soon it is full of his little foot-prints. He lives upon the seeds of weeds and crumbs which he finds about our houses, and which we should always give him. His back is black, his breast white and the bill a bright yellow. In summer they retire far north to raise little ones which they do in the mountains. They are said to lay four or five eggs and make very pretty little nests.

CHEWINK OR TOWHEE.

(Pipilo Erythrophthalmus.)

This bird although belonging to the sparrows does not resemble them. He is about the size of a robin, black and white with some chestnut red on the breast. They come in early spring, and evenings and mornings may be seen perched upon a lofty tree or bush singing away vehemently. They are very common in bushy swamps and thickets where they always make their presence known by their sweet "chewink." The nest is placed in a low bush or on the ground, and is composed of grass and sticks. Eggs, four in number, nearly like those of the brown thrush.

CARDINAL GROSBEEK.

(Cardinalis Virgineanus.)

Another beautiful resident is this brave fellow. He stays with us all the year through, mostly, for when the snow covers the ground and the wind is howling among the pines, all at once you are greeted by the shrill and happy whistle of this beautiful red bird. He is not very hard to mark out for there is such a great contrast between his gorgeous plumage and the glistening whiteness which covers the earth. In summer he retires to the woods where his whistle is occasionally heard by the rambler of the forest. He makes his nest in a lofty bush or tree mostly, but sometimes it is found in low trees and bushes. The nest is a loose structure that you can nearly see through, composed of rough sticks thrown together in a rude manner and hollowed out in the middle. Eggs, four in number, gray or ashy, marked with beautiful lilac.

INDIGO BUNTING.

(*Passerina Cyanea.*)

This beautiful little songster arrives from his western haunts in early summer, and delights to mount the highest tree-tops and pour out his exhaustless supply of music so agreeable to listen to. With the exception of the beak he is of a uniform indigo color all over and is very pretty. They are about the size of a sparrow and are common in briery places and in woods. They are rather shy and do not come very near to our dwellings, except when they first appear they are more familiar. The nest is placed in low thick bushes and briery situations; is composed of grasses. The eggs are four in number, pure white, and a little pointed.

BLACK-THROATED BUNTING.

(*Spiza Americana.*)

This species has rather plain plumage with a black throat. It is very common in large waste fields and swamps. The nest is simple and very much like the last. The eggs, from four to six in number, are white. This is also a summer resident.

BOBOLINK.

(*Dolichonyx Oryzivorus.*)

This bird is rare in this vicinity, being found more abundantly in the New England States, arriving there early in spring. Its color is mainly black with some white, also chestnut red upon the breast. In the spring its song is noted for its sweetness and charming music, poured forth in unceasing strains. They are highly valued for food, and the southern markets are crowded with them in the autumn, where they are sold by the name of reed-birds.

COW-BIRD.

(*Molothrus Ater.*)

This is a common and well-known bird, being found in nearly all parts of the United States. It is a rusty brown or black color, body long. Its peculiar habit of not making a nest is the subject of much wonder. It never possesses one of its own but deposits its eggs in the nests of other birds which hatch them and feed them till long after they are able to take care of themselves, and in so doing often meet with the misfortune of losing their own young. The eggs are dull gray or drab thickly freckled with brown.

SWAMP BLACK BIRD.

(*Agelaius Phoeniceus.*)

This is a bird familiar to us all, coming in early spring along with their cousins they display their crimson shoulders and greet us with their harsh note. Their home is in the swamps and meadows where they may be seen in numbers flying in all directions. Their nests are placed in tussocks or woven in between high weeds with strong stems. They display much sense in thus suspending their nests. They are composed of grass, mud, and seges, all placed tightly together. The eggs are four in number, light blue, variously and curiously marked with black often in the shape of figures or images. The crow black-bird is mostly the same excepting the red shoulders and is a little larger. They live mostly around our houses and delight to fill the firs and evergreens with their nests which are large and coarse. Eggs, four in number, resembling the last described.

MEADOW LARK.

(Sturnella Magna.)

A beautiful singer is this bird. They come in early spring, and mounted high in the bright blue sky, they warble forth their clear sweet music so welcome to us. Sometimes mounting the highest twig of an evergreen they sing for a long time; no doubt but that they feel their high position. In appearance they have long legs which enable them to run with ease. Their back is brownish, streaked with white about the wings. The breast is of a rich yellow, the bill long and pointed. As their name indicates they live in meadows and swamps. They make their nest in bunches of grass. The nest is closed all over except a place in the top for an entrance. The eggs, from four to six, are white, spotted with dull brown, and roundish.

ORCHARD ORIOLE.

(Icterus Spurius)

A gay little fellow is this bird; most of the body is black the rest orange red. They are small but are possessed of a beautiful song. They are among the earlier visitors, and may constantly be seen searching among the blossoms of the fruit trees for insects, at the same time filling the air with their clear notes. They are mostly found in orchards or collections of trees, where they can find an abundant supply of food. The nest is quite architectural, being suspended between two branches or a fork of a limb. It is several inches deep and the materials are woven together with great skill and industry. The eggs, four or five, are white, streaked with black as if by a pen.

BALTIMORE ORIOLE.

(*Icterus Galbula.*)

There are few birds more handsome both in plumage and song than this gay summer visitor of ours. They make their appearance in spring about blossom time, when, with the preceeding species, they search out the insects; at the same time pouring forth their charming and melodious notes. Their plumage is a bright orange yellow and black, which makes them very conspicuous. The nests are almost as attractive as their owners, art and skill being displayed in their structure,—the articles used being wool, rags, cotton and all soft materials it can find; but great care is taken to have all the colors plain, so as to keep their home from being so easily seen. The entrance is woven nearly together and the nest formed into a cup shape cradle, which is suspended from some lofty branch of a tree by being sewed or woven to it with threads and strings, or whatever comes handy. Eggs, four; roundish, of a light green color, curiously marked with black. This bird has been given quite a number of names in regard to color and habits, such as Fire-hang bird, Golden Robin and others. The nests are not very easily secured, on account of being placed so high and hung so far out on the branch, this being a natural instinct for the protection of their handsome home and family world.

AMERICAN CROW.

(*Corvus Frugivorus.*)

We now come to a great trespasser in the feathered race, his chief delight being to uproot and eat the young corn, which has cost the farmers immense time and work to replace or lose. They also destroy great numbers of young chickens and ducks from the poultry yard; they are considered a general nuisance, and are shot by farmers when they get a chance. The plumage is a uniform jet black, the bill and feet large and strong. They remain most of the year, and in winter often fly over one-hundred miles, daily, for food. Their nests are placed in high trees, mostly in the woods, and is composed of large coarse sticks and leaves. Eggs, four or five, pointed, light green, spotted with shades of brown.

BLUE-JAY,

(*Cyanocitta Cristata*)

A tyrannical species is this fellow, always quarreling or robbing the young or eggs of other birds, which they often do without hesitation. They are exceedingly greedy in their habits. Much ripe corn is eaten by them. In autumn four or five of these birds may be seen perched upon a stalk or shock eating away to their hearts content. Their plumage is rich blue and white variously barred and spotted; the head is crowned with a crest or topnot. Their cry is harsh and very unpleasant. Their nests are made of sticks and placed in a tall bush. Eggs four, oblong, their color is dull olive, variously marked with the same.

COMMON WAGTAIL.

(Motacilla Alba.)

When walking along a creek or small stream you are sure to see a small bird of a bluish gray or drab color above and white below, with long legs and bill; this is the Wagtail or Water Thrush. They run or walk along the banks of streams and skim over the water in pursuit of insects and aquatic grubs. They may often be seen running their slender bills through the mud to disclose their food. Their note is a sort of a weak piping or whistle. These birds disappear in autumn, but occasionally some are seen on nice warm winter days. They make their nests under old bridges or in holes along the bank, composed of grass, roots and sticks. Eggs rather small, white or cream color, freckled with light brown spots, four to six in number.

GOLD-FINCH OR YELLOW BIRD.

(Dendroeca Aestiva.)

This member of the warbler family is a gay little fellow. He arrives late in spring, or early summer, and departs for southern climates in autumn. This bird has a beautiful song, nearly equal to that of the canary. Its plumage is a bright yellow, except the wings and tail, which are jetty black; with a few white stripes or marks on the wings. It is very fond of the thistle, dandelion and salad seeds, and may be seen in little flocks around them. Nests are very finely made, and lined with thistle down. Four white eggs, spotted brown and lilac.

MARYLAND YELLOWTHROAT.

(*Geothlypis Trichas*)

Another member of the warbler family. This gay little bird comes to us in early spring and stays through the summer season. It may be seen among the fruit tree buds and blossoms, searching for insects, of which it is very fond. Its more permanent home is in low, wet, marshy ground, where its pleasant notes may be heard almost constantly. Plumage above, olive drab; below, light; head jetty black, and the throat a bright yellow. Eggs small; white, sprinkled with brown.

YELLOW-BREASTED CHAT.

(*Icteria Virens.*)

This is not a very common visitor. Its home is more permanent in the New England States, where it arrives about the middle of Fifth month, (May). It may be found in bushy thickets and woods. Plumage olive green above, breast yellow, a little white also to be seen. Body long and rather slender; bill long, and curved at the tip. In general appearance it somewhat resembles the United States Cuckoo. Nest placed in a low tree or bush, composed of coarse grasses and sticks, and lined with finer material of the same kind. Eggs, four in number, a rich cream color, spotted on the larger end with brown and lilac. This bird has no particular song. The Yellow-Breasted Chat belongs to the warbler family, which comprises a great number of species, all of which are small and mostly gaily colored and nearly all of them are excellent songsters.

AMERICAN REDSTART.

(*Setophaga Ruticilla.*)

This bird is very small and active; and is an early spring visitor. It comes in company with many other small birds of its kind. Plumage black, with red mixed in stripes or bands on the wings; tail long and waved. It may be seen in the woods early, but it only makes a short stay before going north to its favorite breeding place. Nest and eggs not common.

RED-EYED VIREO.

(*Vireosylva Olivacea.*)

This beautiful little bird is very common throughout spring and summer. Its home is chiefly in the woods, where its sweet, clear notes may be heard from morning till night. The tree-tops are its delight, where it hops from limb to limb in search of food, consisting of insects which it catches in great numbers. It is something like the pewee in this respect, darting after and catching flies on the wing. Its nest is placed in a low tree or bush, composed mostly of fine strips of wild grape-vine bark, neatly matted together forming a cup shape nest, which is wove and hung between two twigs or small boughs, somewhat after the oriole style. Four eggs, white with a few faint spots of brown on the larger end. There is a white-eyed vireo, which is much the same in description and character as this species, except that it is a little larger. Color a rich olive green above and white below, with a red or white eye, according to the kind.

CEDAR WAXWING.

(Ampelis Garrulus.)

In song and apparel this bird is very modest, being dressed in a brown coat, and possessed of no note except a low lisping sound which it utters. Although its plumage is so very plain, the texture of it is remarkably fine, being almost as soft as satin. The head has a crest or top-not. Its chief home is in and around the cedars, where it finds its food and makes its nest. It is sometimes called cherry-bird. Eggs, four or five, light blue, thickly spotted with black and brown.

PURPLE MARTIN.

(Progne Subis.)

This is a member of the swallow family, and is the largest of the race. Plumage glistening purple above, and white below, with flat bill and forked tail. It is a common spring visitor, and will build in boxes put up for them near our houses and barns. It has no striking note. Eggs, three or four, of a uniform green color. In shape and size they resemble those of the snail. The Sand Martin (*Cotile Riparia*) is also common, particularly in places where there are high banks and deep cuts in roads, railroads, etc. Plumage dusky brown, with a little white underneath; feet short and formed in such a manner that they can stick to steep places. They make their nests in holes in high banks, which they excavate with their short thick bill, and scratch the dirt out with their feet. Eggs, four in number, are laid on the bare ground, pure white, a little tapering. This bird comes in early spring and remains late.

WARBLERS.

The family of warblers is a very extensive one, there being an almost endless variety of them, distinguished mainly by their colors and locality. These birds are generally small, and mingle in companies, several species feeding and traveling together. Their color is much variegated and mixed—some being among the most handsome of the whole feathered tribe. They receive their name from their beautiful warbling notes. Some of them possess great vocal powers, while others are content with a soft, sweet lisping. They are generally found on or near the ground hopping about among the leaves, turning them over and peeping under them in search of insects, or among old brush piles, in swamps and wet places. Some however, are found swaying and rocking in the highest tree tops, or running along the branches looking under the leaves and snapping up little bugs and flies constantly. The nests of many of our warblers are placed upon the ground and are very hard to find, being mostly covered with leaves or rubbish: some are sunken in holes and others placed upon the surface, while others may be found high in the trees and well out upon the branches, thus proving equally difficult to procure. A greater portion of the warblers retire to the north to breed, while a goodly share remain with us. The northern warblers are seen mostly in the early part of spring and autumn when they are passing on their migratory journeys. Warblers in general are shy, keeping in the thick woods and underbrush, and always contrive to conceal themselves when an observer is near, except certain

species, which are not so particular about being watched. Very often their curiosity is excited as much as the observer, when both do an equal amount of staring. It is quite amusing to see some of them perch on a branch near by, and look and twitter, all the while going through various attitudes. As a general average the eggs of the warblers are white or cream colored, specked with a few dark spots on the larger end. Some of their nests are beautiful and artistic, while others are mere pretenses. Our most common varieties are the Yellow Rumped, (*Dendroeca Coronata*); Blackburnian Warbler, (*Dendroeca Blackburniae*); Summer Yellow-Bird, (*Dendroeca Aestiva*); Black-Poll Warbler, (*Dendroeca Striata*); the Maryland Yellow-Throat, (*Geothlypis Fricas*); Yellow Breasted Chat, (*Icteria Virens*); American Redstart, (*Setophaga Ruticilla*), and others. You can scarcely miss seeing the Maryland Yellow-Throat when on a spring ramble, for the swamp and bushy lands and brush heaps are alive with them, jumping and flitting in ceaseless activity: besides their clear ringing notes which vibrate in the pure air with great shrillness. When near a company of these little warblers who are singing in concert, it is almost deafening to the ear. The head of this bird is rich black, the throat bright yellow, upper parts are drab or olive. The nest of this species is placed upon the ground or in a brush heap or brier patch. It is not a fine structure, but is simple and unpretending. There are from four to six eggs, very small, white with a few faint specks on the larger end. The head of this little beauty is so black that its tiny eyes are scarcely discernable. Some of the Water Thrushes are warblers, and grace-

ful little beauties they are, with their long bills and slender necks. They walk in a very airy manner, and almost noiselessly move from one place to another, searching for food as they go, which consists of aquatic insects and worms. Their nests are usually placed under a projecting bank of a stream or a mossy knoll. It is a neat structure composed of moss, grass and leaves. Four or five white eggs, spotted with brown on the larger end.

BALD EAGLE.

(*Haliaeetus Leucocephalus.*)

Although we do not see this large bird on our daily rambles, yet he occasionally makes his appearance in our section of country, either by a driving wind or by wandering from his native shores of lakes and rivers. When spied this far from home he is almost universally attacked by the people, either to get rid of his presence, or to obtain his kingly form for the cabinet. When nicely stuffed and mounted this bird has a fine appearance, as he also has in life, when wheeling and circling in majestic evolutions, or poising himself for a moment he descends like an arrow from his dizzy heights in and among the wild crags of mountainous regions or river shores. This bird's head is covered with white feathers, giving him his characteristic name. He feeds upon hares, young lambs and other small animals, which he marks out and secures with deadly accuracy; fish constitute a part of his diet, but this delicacy is never obtained by honesty, but is robbed from the Osprey or Fish Hawk, which dives for them. This bird scarcely ever attempts to resist the

cruel onsets of the eagle, for he knows that the latter is too strong for him. This king of birds may be seen in his haunts, sitting on the lofty branch of a dead tree or crag, eyeing the country around a distance, and when any victim is espied he screams and descends upon them. This bird was so honored as to be selected as the emblem of our country, and his likeness is stamped upon our principal coins. Benjamin Franklin, the well-known American Statesman and Philosopher, made objections to the selection of this bird for the purpose, on account of its dishonest habits. Its nest is a huge mass of sticks placed upon the flat top of a high precipice or crag. Two eggs are laid, which are large. The young are defended by savage bravery.

WILD GOOSE.

(*Bernicla Canadensis.*)

For the observance of the wild goose, you must watch for them during the time of their spring and autumn marches across the country. Generally they fly high and in an angular line the shape of a V or L, but sometimes when they have been journeying long and are weary, they fly in a confused manner, and come near to the ground, when they may be captured with ease. Sometimes when fired at while flying, some are occasionally struck and fall to the ground. If not mortally wounded they may be kept in company with other fowls; but as sure as a flock of its old companions are seen passing either way, they are taken with an irresistible desire to rise and join them, and if not secured will do so. They retire to the far north during the season.

RED-TAILED HAWK.

(*Buteo Borealis.*)

This species is more familiarly known as the Chicken Hawk. It makes its abode with us most of the year, being seen in winter quite frequently, soaring around in majestic circles, almost comparable to the flight of the eagle. Its eye is capable of viewing large tracts of land at once, and when any unlucky victim is seen, the hawk descends upon it with the swiftness of an arrow, and bears it away to some retreat in the woods. Its food consists of rabbits, field mice, young chickens and birds. This specie is quite large, the plumage dark brown above and white below, upper side of the tail a rich brownish red. The nest is placed in a tall tree, and is composed of sticks, leaves and other large coarse materials. Eggs, four or five, ground work light, variously marked and blotched with dark brown.

TURKEY BUZZARD.

(*Cathartes Aura.*)

Every one is familiar with this useful scavenger of our land. It may be seen any time of the year, but more frequently in summer. It is considerably larger than the crow, color sooty black, excepting around the neck there is a dull red ring. The head is almost without feathers, which is said to be of great importance to the health of this bird, owing to its food which is always caron. A penalty has been fixed against the destruction of these useful birds, so as to prevent them from being killed. They congregate in large numbers around the dead body of an animal when found. The nest is usually placed on the ground in the woods by some log or fallen tree. Eggs are two in number, larger than a hen's egg, much marked with green and brown.

QUAIL OR BOBWHITE.

(*Ortyx Virginiana.*)

In the latter part of spring or early summer you may hear bobwhite uttered from the direction of some wheat field. This is our American Quail or Partridge. It is a beautiful little bird. Plumage bright reddish brown above and light below, bill short and thick, feet small and suited to scratching and running, which they do most of the time. Their note is a sort of a whistle, resembling the syllable above given, which may be heard most any time during the summer season. These birds are very good for food, and are much sought after. They are called by different names, according to the country they are in. The nest is placed on the ground in a secure place, and is composed of grass and leaves. The eggs number from ten to eighteen, pointed at one end, pure white when fresh but soon get soiled from contact with the ground. The young brood run with the parents as soon as hatched, like little chickens.

GREEN HERON.

(*Butorides Virescens.*)

This bird is better known by a disgusting name which is commonly given it. It resides with us through the summer, living near large ponds or creeks, where it subsists on the fish and other aquatic animals and insects, which it secures with its long bill. The legs are long and fitted for wading. Plumage is a beautiful olive green above mixed with brown, and light below speckled with dark on the breast. When startled it utters a peculiar cry and alights on a near object. Nest placed in a tall tree, composed of coarse sticks, four eggs of a uniform pale blue.

MOURNING DOVE.

(*Zenaidura Carolinensis.*)

Mostly this bird is called turtle dove. The above name was given it because of its mournful notes which greet us in early spring. These birds are very gentle and loving to each other. They much resemble pigeons, of which family they are a member. The plumage is a beautiful rosy pink, with some black and white on the wings and tail. When flying the wings emit a sharp whistling sound, which plainly characterize this specie, and the tail is spread showing the white feathers. The nest is placed in an apple tree in the orchard, or on the top of a stump in the woods: it is a frail structure, being composed of a few sticks loosely thrown together in the shape of a flat platform which you can almost see through; upon this they lay two beautiful white eggs. They are very careful of their eggs and young, and show great anxiety when they are approached or taken from them at any time.

RUFFED GROUSE.

(*Bonasa Umbellus.*)

This bird is sometimes called prairie-chicken, or drummer. The males in spring mount an old log in the woods and beat it with their wings several minutes in succession: this is the cause of the drumming sound so familiar to those who live on or near prairies where these birds delight to live; also in tracts of waste ground. Their plumage is beautifully barred and spotted, being black, white and rich brown; the wings have bands of white across them. The nest is placed on the ground, and is composed of grass and leaves. The eggs number from six to eight, oval in form, dingy white.

KILLDEER.

(*Oxyechus Vociferus.*)

This is a member of the plover family, coming early in the spring they remain till the latter part of autumn, when they wing their way to the sunny south to spend the winter in revelry. They are good runners, skimming over the ground with great ease: wings are long and pointed, plumage brownish above intermixed with white, breast and under parts silvery white. Stony fields and meadows are the home of this bird, especially those which have been lately plowed, on which occasions it feasts upon the unearthed worms and insects. Its nest is made in low moist fields away from dwellings, and placed on the ground, but there is not much care taken to make it nice and comfortable. Four or five eggs, well pointed at one end, about the size of that of the crow, ground color—light ocher, thickly marked and scratched with black. When the eggs are laid, all of them are resting on the large end.

COMMON TERN.

(*Sterna Fluviatilis.*)

The shores of the sea, rivers and large lakes are the home of this beautiful bird, plumage glossy white, and black on the wings and tail, bill and feet generally light yellow. This specie is great on the wing, flying around in large circles over the water and going out quite a distance from the shore. These birds are closely related to the gulls, and the two flock together in large numbers. The nest is placed along some rocky shore among the weeds and grass, being composed of this material. Eggs, four to six, ground work light brown, covered with dark spots.

Our Winter Birds.

The bird life in winter is very interesting, and the various members which constitute the band left with us after the departure of their summer friends, receive more notice as a general rule, because so many have disappeared, and because during the winter season there are not so many other attractions. How cheering it is—when the fields are bare and brown, and the trees destitute of their rich verdure—to see some active, happy member of the bird family busily engaged in gathering food, and, ever and anon pouring out a song which leads the wandering mind of the observer back to summer days of pleasure. In the depth of winter summer still lives, which saying is verified by our seeing and hearing many instances of active life. Many of our winter birds depend upon the seeds of various weeds for a subsistence, and should these be inaccessible they often experience great want for food. In such instances many species which are otherwise shy, become quite tame, and may often be seen flying around our houses, seeking aid, which we should readily grant them. Others again feed pretty much upon crumbs which they find around our homes. During mild sunny days we are often greeted with the clear notes of the Field Sparrow (*Spizella Pusilla*), which generally remains with us throughout the year. Also others very seldom seen during the cold weather, suddenly make their appearance upon these spring-like days. Where they take up their abode, or upon what they feed during their concealment is a mystery to some. The Wagtail

or Water-Thrush (*Motacilla Alba*), is an example of this kind. We may not see them for weeks at a time, and perhaps have almost come to the conclusion that they have gone, when, all of a sudden a whole flock may appear, and spend a few hours in skimming over and around the waters of our creeks and ponds. The Nuthatch (*Sitta Carolinensis*) also is a common resident throughout the year, but during the winter season are much more frequently seen while engaged in running up and down the trunks of trees, hammering away in search of insects, and uttering a continual chatter or warble, which can scarcely be regarded as a song, but is in no way unpleasant to the ear. The Blackcapped Chickadee (*Parus Atricapillus*) is mostly an associate of the Nuthatch and the two are often seen together: the voice of the latter is very pleasant and somewhat resembles the syllables chick-a-dee-dee, from which it derives its name. These two birds resemble each other in plumage: the back of each is a beautiful blue, and the under parts white: the head of the chickadee, especially upon the crown, is a deep black. Both these species retire to the woods during summer. For gorgeous beauty and rich contrast with the surrounding scenery, the Cardinal Grosbeak (*Cardinalis Virginianus*) holds a prominent position. What a handsome sight it is in the depth of winter, when the ground is covered with snow, to see this beautiful bird, perched upon the fence or a tree in close proximity to the house, and to hear his penetrating whistle echo through the leafless branches. This is one of our most gorgeous feathered friends, the body being a brilliant red, with an intermixture of brown upon the wings, tail and top-not; a

patch of black around the eye. During summer this bird retires to the woods, and becomes quite shy. The Snow Bird (*Junco Oregonus*) is a regular winter visitor, and makes its appearance about the latter part of autumn or the beginning of cold weather. They appear in small flocks, and move about in a lively manner, uttering a low chirp which is characteristic of the sparrow family, of which he is a member. Their food chiefly consists of the seeds of weeds and other dead vegetation of the past year, but when these are covered up they come in numbers to partake of the crumbs which they find around our dwellings. When snow is upon the ground, the marks of their little feet make a very pleasing appearance. This fine little fellow retires to the far north and west in warm weather, where they make their nests which are said to be very pretty. Besides those already mentioned, we notice some of the hawk family, especially the Sparrow Hawk (*Tumunculus Sparrarius*) and the Red-Tailed Hawk (*Buteo Vulgaris*) both of which we see flying in majestic circles at a height. The red-tailed hawk is large and of a dull, brownish gray color, with the upper part of the tail a dusty red. The sparrow hawk is the smallest of the family, and is much the same color as the former. It utters a plaintive cry somewhat on the whistling order. Numerous members of the sparrow family remain with us all winter; the most conspicuous is the English Sparrow (*Passer Domesticus*). A great many birds give us a short visit in the latter part of autumn, and although they do not remain, they may be included amongst the rest. The Pine Grosbeak (*Pinicola Enucleator*) is a bird of this class, and may be seen in

flocks of twenty or thirty perched upon the pine trees, engaged in devouring the seeds of the cones. They utter a very pleasant note, and fly in an undulating manner. Color red, with black, brown and white intermixed. The American Crow (*Corvus Frugivorus*) is also common during the year, and during winter may be seen flying in long lines to their feeding grounds; and are said to go one-hundred miles and over in search for food, when the weather presses them, but they generally return to their accustomed roosting place in the evening. At this time of the year they become more daring, and fly all around the barns and houses seeking for food. The Winter Wren (*Anorthura Troglodytes Hyemalis*) is noticeable, especially in severe winter, and may be seen about wood-piles, heaps of rails, or other sheltered places, peering into vacancies, and moving in an active manner, which is a characteristic of the wren family. The Screech Owl (*Scops Asio*) is common, and its doleful cry may be heard at various times through the winter. It is more frequently seen during the milder portion of the season, when living in hollow trees, as they often do. They are often seen sitting in the opening enjoying the warm rays of the sun. The Snowy Owl (*Ryctea Scandiaca*) is seen in the United States in winter only. It lays its eggs and rears its young about the first or middle of Second month. In summer this bird retires to the far north where ice and snow abound. It is very large, and has a snow-white plumage. Eagles and Cranes are sometimes seen in this locality during the spring and autumn migrations. Many other varieties make their home with us the entire year, but I have only described the most common.

THE FLIGHT OF THE BIRDS.

The following beautiful poem was taken from a scrap-book, and as the feeling of its author exactly corresponds with mine, I insert it in my pages, which have been dedicated to a description of these happy creatures.

Last night I sat beside the pane
And heard across the mist of rain
The wild birds twitter low,
And thought how soon the leafy nests,
Now warm with little speckled breasts
Would be filled full of snow.

I saw the withered wet leaves fall,
And cried, God shield and save ye all,
Black-birds and blue and brown;
And all ye tribes of noisy things,
With linings on your ashen wings
Soft as thistle's down.

And ye with topknots on your heads
Of crimson grains or scarlet reds,
And tongues so wild and loud;
God save, I said in kindest care,
Seeing ye drift along the air
Like some bright sunset cloud.

And ye in gray and russet suits,
And ye with ruffles all in flutes
About your necks a shine;
When April sends her lamps of dew,
To light the darkened daisies through,
God bring ye, darlings mine!

And ye with tender tuneful throats,
And ye with white and spotless coats,
And ye that hold in scorn
Soft music, and while summer gleams
Sit by your doubles in the stream,
Snapping your bills of horn.

And let what will my life befall,
I shall love and need you all;
Nor can my heart make choice
Or hold the nightingale preferred,
Above the cuckoo, less a bird,
Than just "a wandering voice.

Therefore I pray, and can but pray,
 God keep and bring them back when May
 Shall come with smiling train,
 Thick brodered with leaves of wheat,
 And butterflies and field pinks sweet,
 And yellow bees and rain.

Yes, bring them back across the seas,
 In clouds of golden witnesses,
 The grand, the grave, the gay;
 And if Thy holy will it be,
 Keep me alive once more to see
 The glad and glorious day.

As so many persons are habitually inclined to kill and destroy the birds they see, whether guilty of any crime or not, the following lines taken from a little book on kindness to animals and other creatures which inhabit the earth, will here be inserted, to serve as a warning and pleading speech to those who are so inclined. It does not give anyone pleasure so to do; or if it does at the time, they feel no better afterwards.

Don't kill the birds—the little birds,
 That sing about your door,
 Soon as the joyous spring has come,
 And chilling storms are o'er.

The little birds—how sweet they sing;
 O let them joyous live!
 And never seek to take that life
 Which you can never give.

Don't kill the birds—the little birds
 That play among the trees;
 'Twould make the earth a cheerless place,
 Should we dispense with these.

The little birds—how fond they play:
 Do not disturb their sport,
 But let them warble forth their songs,
 Till winter cuts them short.

Don't kill the birds—the happy birds
 That bless the fields and grove;
 So innocent to look upon,
 They claim our warmest love.

The happy birds—the tuneful birds,
How pleasant 'tis to see !
No spot can be a cheerless place,
Where'er their presence be.

A PETITION OF A BIRD.

Oh! stay your hand, my little boy,
And do not rob my nest;
Why should you, for a moment's joy,
My happy brood molest?



PART II.

INTRODUCTION TO PLANTS.

Botany is the study of plants in all their various branches and divisions, which is interesting and instructive. Plants are divided into two organs—the organs of vegetation and the organs of reproduction. The organs of vegetation are divided into the root, stem and leaves. The organs of reproduction are divided into the flower, fruit and seed: the seed is divided into the embryo. The flower has one division—the perianth: it has four parts—the corolla, calyx, stamens and pistil. The corolla is divided into petals; the calyx into sepals; the stamens have two parts—the filament and the anther; the pistil has three parts—the ovary or seed vessel, the style and stigma or spongy crown which receives the pollen. Leaves are put into two classes, according to their veins—the parallel veined or exogens, which have soft stems, and the net veined or endogens which have woody stems. The net veined are divided into two classes or divisions—simple when the leaf is in one piece, and compound when divided into several parts. Leaves are also divided into several classes, in regard to their shape, such as *linear, lobed, orbicular, cleft, parted, kidney shape, heart shaped, waved, toothed, lobate, oblong, oval, etc.* All flowers are put in various classes and ranks, according to their flowers, roots, stems and leaves. Botany and Natural History each teach us to read in the book of nature with great pleasure and satisfaction.

PANSY OR HEARTS-EASE.—(VIOLA TRICOLOR.)

This plant is cultivated or runs wild, roots annual or biennial, grows low upper leaves oval, the lower ones heartshaped; stipules large and leaflike. Corolla, yellow, whiteish violet-blue, purple, varying or mixed, large and showy when cultivated, smaller and less color when wild, leaves much cut and parted, somewhat resembling the crow-foot family. Plant blooms in spring and summer; belongs to the Violet family.

STAR GRASS.—(HYPOXYS.)

Flowers small, bright yellow, petals six in number, evenly divided forming a star; flowers are few and close fastened to the seed vessel; stamens six to eight with lobed or eared anthers. Stems long and smooth with two bracts at the base of each pedicel; leaves, long and grasslike, with a sharp edge on one side, covered with downy hair, with a sharp edge on one side. Plant small with bulbous root, growing in dry localities and blooming in summer, a member of the Amaryllis family.

TRUMPET HONEYSUCKLE.

(LOMICERA SEMPERVIRENS.)

The uppermost pair of leaves on this plant are united into one rounded body or double lobe; flowers long and trumpet shaped arranged in whorls or circles around a slender stem; a woody climbing plant found wild in the south. Flowers red and yellowish inside, parted at the base; stamens, four reaching outside the flower; pistil, longer; stigma roundish or knob form, green or yellow in color; anthers, brownish. Plant blooms in early summer and belongs to the Honeysuckle family.

BLUE-EYED GRASS.—(*SISYRINCHIUM*.)

Flowers, small, blue or purple with a small yellow heart. Petals, six, evenly divided, stigmas simple, stems or scapes two winged, from fibrous roots, leaves, long and narrow, much like grass, dark green, coarse to the touch, grows in small bunches, flowers delicate, lasting but a short time after being plucked. It blooms in spring and summer, dry localities.

WILD IRIS.—(*IRIS VIRGINICA*.)

Plant tall and slender, leaves flat and coarse, lance linear in shape, light green in color, bulbous or running and sprouting roots. Plant grows in large bunches in wet and marshy ground. Flowers several on a stem alternate, large bluish purple. Petals, three in number, sepals also three, and are the same color as the petals making six similar divisions. The edges of all are curled or ruffled. Blooms in late spring or early summer. Belongs to the Iris family.

SESSILE BELLWORT.—(*UVULARIA SESSIFOLIA*.)

Plant consists of one stalk from which quite a number of alternate, sessile leaves grow, light green parallel veined, oval lance shape, root fibrous. Flowers, numerous, hung from under side of the stem, rich cream color, petals and sepals joined in one to the base of flower, edge scalloped or toothed, pistil single, stigma small, stamens six or eight. Blooms in early spring, locality, woods and low grounds. Plant belongs to the Bellwort family.

TOADFLAX.—(*LINARIA VULGARIS*.)

Flowers sack shaped longer than wide, pale yellow with an orange colored palate, also a spur at base long and pointed; in general appearance the flower somewhat resembles the snap-dragon. Stamens, four, filaments white, crowned with brown anthers; pistil single; leaves, very linear, scattered on a tall stem, pale green in color, roots fibrous. Common in fields and by roadsides, blooms in summer. This plant belongs to the Figwort family and is also called butter and eggs.

SKULLCAP.—(*SCUTELLARIA LATERFLORA*.)

Flowers in terminal or one-sided racemes, small, the Corolla tubular rising, the upper lip strongly curved, the lower ones entire, color blue or purple with two white stripes on the under lip. Stamens long and slender having the curve of the flower and is silky in appearance. Calyx resembling a helmet, very curious in form. Stems nearly square, smooth and tall. Leaves lance shape or oblong pointed on slender stalks. Blooms in summer, location wet low places. Plant is a member of the large Mint family.

WILD PHLOX.—(*POLEMONIUM REPTANS*.)

Stems weak, leaves lance or oblong pointed, fibrous roots. Plant grows from one to one and one-half feet high. Flowers in a small head or scattered, pale red, pink or whitish. Petals from four to six, rounded, stamens few being covered up in a little cell at the base of flower, blooms in summer, location low wet ground. Phlox family.

WILD HONEYSUCKLE.—(*LONICERA GRATA*.)

Flower, a delicate pink shading to white; long cells are at the base of flower, these are deep pink or red; petals five in number, ruffled around the edge; stamens five, very long; filaments, same color as flower cell; anthers, a light brown; pistil single, very long, same color as stamens; stigma, black or nearly so. Stems are exogenous in nature; leaves bright green. of an oval shape; Honeysuckle family.

LILY OF THE VALLEY.—(*CONVALLARIA*.)

Flower small, bell shaped, beautiful white; petals all joined in one and parted at the edge; stamens, six in number, yellow; pistil large, light green; calyx wanting; stems short and slender; flowers hung from one stem which is subdivided into smaller ones. Bulbous roots; leaves light green, parallel veined, quite large; the plant belongs to the Lily family.

SMALL BUTTERCUP.—(*RANUNCULUS*.)

Flower small, bright yellow; petals, five; stamens also five; compound pistil; leaves small, divided, serrate margin; stems, short and downy; roots fibrous. Blooms in early spring; found in dry localities. The plant is slightly inclined to run; belongs to the Crowfoot family.

DUTCHMANS BREECHES.—(*Dracentra Cucularia*)

A bushy plant about two feet high, bright green leaves, somewhat cleft and cut, flowers large. Corolla edged with pink. Two large spurs, one on each side, bright pink in color.

BELLWORT.—(*UVALARIA PERFOLIATA*.)

This plant is common in the east, and blooms in early spring; it is to be found anywhere. Petals three in number, sepals also three, green at base, shaded to the color of flower. The segments are long and tapering, divided to the calyx, stamens flat crowned with pointed anthers. Pistil tall and straight, split into three parts at top, and is mounted on the seed-pod, stems long and slender, leaves perfoliate or pierced by the stem, roots fibrous. The plant belongs to the Bellwort family.

WILD GERANIUM.—(*Geranium Robertianum*.)

Flower small, purple or deep pink. Petals five in number. Stamens ten to twelve, filaments white crowned with brown. Stems spreading, leaves dark green, three divisions, and each part twice pinately cleft. Situated in moist woods and meadows, blooms in early spring; plant belongs to Geranium family.

MAY FLOWER OR APPLE.—(*Podophyllum*.)

Stamens twelve to eighteen; petals rounded, eight to nine; flower snowy white; leaves large, shield shape, deeply cleft, mounted on thick stems with a flower in the center. Pistil very large, ovary forms the base; stigma rough, of a yellow color; fruit a large yellow plumb-shaped berry or apple which is eaten by some people; member of the Barberry family.

QUAKER LADIES.—(*OLDENLANDIA HOUSTONIA*.)

Flowers very small, pale blue with a yellow heart, petals four in number joined at the bottom, calyx very small and divided into four sepals, a long slender tube at the base of flower. Stems long and slender, leaves so exceedingly small as to be scarcely visible. Roots fibrous, location dry banks and roadsides. Blooms in early spring. flowers are very numerous, plant belongs to the Madder family.

HAWK WEED.

Flowers rather small, bright yellow petals ten to twelve in number, stamens many and are so close together as to form a compact mass, pistil not distinct. Flowers placed in bunches or whorls around a tall green stem, leaves deeply cut or rounded dark green, roots fibrous. Blooms in early spring, location low wet meadows, plants to be found in great abundance, Composite family.

LARGE YELLOW VIOLET.—(*VIOLA PUBESCENS*.)

Flower a bright yellow with a small spur at the base, petals five in number, the lower one being the largest and is marked with a number of dark brown lines. Heart reddish in color, stamens hairy, stems long and smooth somewhat triangular and leafless except at the top. Leaves light green heart or kidney shaped slightly toothed around the edge. Roots fibrous, location dry stony woods. Blooms in early spring, Violet family.

TALL BELL FLOWER.—(*CAMPANULA AMERICANA.*)

Flowers, small and bell shaped, a bright blue color; petals, five in number; stamens also five, and rich white triangular anthers; pistil, single, long and curved; calyx green and is divided into five sepals; stems very tall and smooth, thickly covered with oval green leaves. Flowers grow in bunches at the end of the stem; roots fibrous, near the surface of the ground; location low, rich, wet ground. Blooms in early spring and belongs to the Campanula family.

SHEEP SORREL.—(*RUMEX ACETOSELLA.*)

Plant low and small, bushy in character; roots fibrous; stems rather short; flower bell shaped and drooping, bright yellow; petals five or six; stamens the same; calyx green, and is divided into six sepals. Fruit a small pod; leaves lobed, halberd shaped or parted, they are sour to the taste; plant is common in yards or gardens; belongs to the Buckwheat family.

WILD COLUMBINE.—(*Aquilegia Canadensis.*)

Flowers scarlet, yellow inside, of a nodding character, they are divided into four apartments resembling pipes; there are four spurs at the back each of which is hooked or knobbed; Stamens many and long extending outside the flower; stems tall and rather slender; leaves dark green, somewhat heart shaped, much divided and cut around the edges. Roots near the surface of the ground, fibrous in texture; location rocky places; a member of the Crowfoot family.

BLUE VIOLET.—(*VIOLA CUCULLATA.*)

Flower dark blue with yellow heart; stamens flat and short; single pistil; petals five in number; calyx green with a spur at the back; sepals five; stems long and slender; leaves light green, deeply cleft or parted, growing on the ground, they are slightly rolled when young; belongs to the Crowfoot family.

DOGTOTH VIOLET.

(*VIOLA CANADENSIS.*) (*ERYTHRONIUM AMERICANUM.*)

Flower pale yellow; petals six or seven in number, lance shaped with pale red on the underside; stamens six crowned with brown anthers; pistil single, mounted on a large green ovary; leaves parallel veined, rich green spotted with beautiful brown; stems long and quite large, same color as leaves without brown.

WHITE VIOLET.—(*VIOLA* —)

Leaves lobate in shape, green and parallel veined; stems short and slender covered with down; flower pure white except a lobe at the back which is blue; petals five in number with a small yellow heart.

SPRING BEAUTY.—(*CLAYTONIA VIRGINICA.*)

Leaves small situated at top of stem, which is long and slender, pink in color, net veined; flower white, striped with pink; petals five in number; stamens five white mounted with small pink anthers; pistil double. This flower belongs to the Purslane Family; roots bulbous leaves linear in shape, light green.

BLOOD ROOT.—(*PAPAVER SANGUINARIA*.)

Leaves lobes or cleft, light green, net veined; stem long and thick, light pink in color and secretes a red juice from which it derives its name. Flower pure white; stamens fifteen to eighteen, white crowned with yellow anthers; petals thirteen or fourteen, oval; pistil long and oval, stigma double, pale brown; flower belongs to the Poppy family.

PERAWINKLE.—(*VINCA* —)

Leaves oval in shape, dark green in color, parallel veined, stems short and joined between the leaves; flower blue shading down to white at the calyx. Petals five in number and deeply set at the base, forming a cup. The calyx is green, and is divided into five sepals. Stamens missing; pistil compound; belongs to the Dogbane family.

MOUNTAIN PINK.—(*PHLOX SUBULATA*.)

Leaves linear in shape, rich green, stems short and numerous; flower bright pink; petals five in number, touched with dark red at the base. Receptacle small and deep; stamens number from five to seven; single pistil; roots of a fibrous nature, and easily propagated.

PARTRIDGE BERRY.—(*MITCHELLA* —)

Leaves orbicular, of a dark green color, net veined, stems very short and slim, real blossom is missing; vines of a running nature, to be found in the woods in dry situations. Berries are about the size of a pea, bright crimson. This plant belongs to the Madder family.

LIVERWORT.—(HEPATICA TRILOBA.)

Leaves placed close on the ground in a whorl around the stem. They are rich green, and are divided into three lobes or rounded parts. Stems stand about six inches high, and have a woody appearance. Flower pale blue; six petals; stamens from eighteen to twenty; white; compound pistil; calyx green, and divided into three sepals; a member of the Crowfoot family.

DOGWOOD BLOSSOM.—(CORNUS FLORIDA.)

Flower creamy white; petals four, tipped with red or light pink, crumpled at the end; stamens inclosed in little cases which open when ripe; pistil wanting; stems are exogenous; leaves heart shaped, bright green. This tree belongs to the Cornel family.

ANEMONE OR WIND FLOWER.

(ANEMONE NEMOROSA.)

Flower delicate white, petals seven, stamens numerous, the filament white crowned with yellow anthers, pistil compound with many seed vessels, stems long and slender, roots fibrous, leaves small green and cleft. This flower is a companion of the Spring Beauty, and both may be found in early spring, in the woods, situated in dry places. This plant is a member of the Crowfoot family.

LARGE BUTTERCUP.—(*RANUNCULUS BULBOSUS*.)

Flower bright yellow; petals five in number; stamens numerous; filaments very slim; anthers same color as the petals; compound pistil somewhat resembling a small pineapple; calyx small divided into five sepals which turn back from the base of the flower. Stems long, buds downy, Leaves linear or cleft, roots bulbous, plant may be found in rich low lands and meadows belongs to the Crowfoot family. Blooms early in the spring.

INDIAN TURNIP. (*ARISÆMA*.)

This plant generally known as the Priest in the Pulpit is to be found in low wet regions; flower consists of a tube-like cell over which hangs a spathe or cover, in the cell stands what is called the spadix, which is long and smooth with a large rough seed vessel at the base. When full grown the spathe is a beautiful rich brown striped with pale green, the spadix is the same color. Leaves bright green, parallel veined somewhat lance shaped; Roots bulbous, belongs to the Arum family.

SNOW DROP.—(*GALANTHUS*.)

Leaves linear, dark green, and very abundant; stems short and slender, joined in bunches; flower bell shaped and born in early spring. Petals six, white tipped with greenish yellow; stamens six, crowned with bright yellow anthers. Pistil long and straight, calyx missing, seed pods very large. Roots bulbous; belongs to the Amaryllis family.

JEWEL WEED.—(*IMPATIENS FULVA*.)

Flower sack shaped, longer than broad, of a deep orange color, thickly spotted with red, those inside being the largest. The flower has a flap or lip at the opening, serving for a lid or cover. There is also a curved spur at the back somewhat resembling a handle: they look similar to the pointed dippers used by dairy-men. Stamens and pistil wanting; calyx small, three lobed. Plant grows two or three feet high, roots fibrous; leaves ovate with slightly serrated margin; flower stems long and slender. A familiar name for this plant is Touch-me-not; found in shady wet soil; blooms in summer; belongs to the Balsam family.

WILD YELLOW LILY.—(*LILIUM CANADENSIS*.)

Stalk grows two or three feet high, is smooth and rises from a fibrous root; leaves lance shaped and form whorls at equal distances apart: they are parallel veined; flowers yellow or orange with brown spots inside: perianth is divided into six equal petals with pointed tips, the whole being bell shaped; stamens same number; anthers large rich brown; pistil one, with large stigma, brown and three lobed, the same as the ovary which is divided into three cells and contains two rows of seeds in each cell. Blooms in summer and is one of the day lily specimens. Found in meadows, banks of streams, etc.; it is a member of the Lily family.

EVENING PRIMROSE.—(*OENOTHERA BIENNIS*.)

Plant tall; leaves lance shaped or ovate at the base, growing in bushy bunches three or four feet in height. Flowers in a spike opening at sunset or in cloudy weather; very sweet scented; root biennial; blossoms yellow, petals four lobed, stamens six short; pistil longer; style single; stigma with four divisions resembling horns; the calyx consists of a pouch under the flower; found in meadows and fields; blooms in summer and belongs to Evening Primrose family.

WILD ROSE.—(*ROSA LUCIDA*.)

Plants growing from one to two feet high usually prickly, leaves dull green or bright, with serrate margin. Fruit a berry which turns bright red when ripe and crowned with a rough brown substance; flowers single, or two or three together, very open, light pink; petals four or five, somewhat lobed; stamens many, anthers yellow or brown; calyx cup shaped and divided into five sepals which are long and pointed. Blooms in summer and is commonly found in fields, meadows and timber. The rose family is a large one, there being species both wild and cultivated, some of which have been brought to a high state of perfection. There are many other plants belonging to the family which do not resemble them much. They are principally cultivated for their beauty and fragrance.

LOBELIA.—(*Lobelia Spicata.*)

Stem simple, straight and slender, one or two feet in height, most of the leaves situated at or near the bottom ovate or lance shaped. Flowers pale blue in a spiked raceme, corolla unequally five lobed, split down on the upper side, stamens five united in a tube, blooms in summer and fall. Situation dry banks and roadsides. There are several others besides this species belonging to the Lobelia family.

TRAILING ARBUTUS.—(*Epigaea.*)

This plant is sometimes called May Flower, but mostly goes by the name above given. It is one of the earliest blooming plants coming out almost before the snow has melted away and greets us with its bright happy face. It is a trailing plant, scarcely woody, with evergreen heart shaped leaves. The corolla or flower is salver shaped with a tube. It is a native of the Northern States and is much prized for the rich fragrance of its beautiful pink blossoms. Ground Laurel is another name which has also been applied to this plant. Scarcely any other spring flower is sought with such eagerness as this one, principally because it has such an elegant perfume. It may be found about the middle of the Fourth month, on sunny banks and sheltered positions, mostly in the woods. Petals three to five and stamens likewise; it is a member of the Heath sub-family.

MONKEY FLOWER.—(MIMULUS.)

This plant grows to the height of two or three feet and is found in meadows and wet grounds, the stems are of a square form having three or four distinct corners; the plants grow together in bunches and have the general appearance of weeds: the leaves are close together, and are lance oblong in shape, slightly serrated. Flower is blue with a lighter lip, it is double lipped, the upper half turned back the lower half turned down; stamens four, in pairs, two long and two short; calyx elongated, five angled and five toothed, stigmas with two broad lips; a member of the Figwort family.

WILD GINGER.—(ASARUM.)

The Canada Asarum or wild ginger is an early spring bloomer, usually found in wet or moist localities. Plant is small, as stemless herbs with a pair of heart or kidney shaped leaves, which are net veined, with a flower between them, rising or hanging out from the spicy tasted creeping root stalk; calyx short three cleft or lobed; twelve stamens which are united at the base of the style, and are pointed above the anthers: the leaves are always on long footstalks, the bud and flower are generally of a dull color. The Wild Ginger is a member of the Birthwort family. The well known pipe vine or Dutchman's pipe belongs to this family, it grows tall and twines well on racks or trellises, the leaves are large and the flowers very curious resembling a pipe.

AUTUMNAL LEAVES AND GRASSES.

When the bright sunny days of autumn have arrived and the woodlands are radiant with a thousand brilliant hues and the grasses are ripened and formed into their perfect beauty, then is a most pleasant season for rambling, particularly when the falling nuts lure the youthful to the woods. The beautiful leaves of the maple, colored with crimson and gold elegantly blended together is perhaps one of the most attractive of fall leaves. Oak leaves are all very pretty, they are usually dark red or brown, while those of the poplar are always yellow, these combined with the white beech and many bright crimson leaves which adorn the small bushes and plants: all these join in making a most beautiful scenery which Jack Frost soon destroys. When these leaves are pressed they will retain their shape and color perfectly, and make an elegant boquet if tastily arranged. Many references have been made to the bright colored beaves of autumn by the poets of both Europe and America.

The Golden Rod is another feature of beauty which ornaments the landscape during the fall, it grows from two to three feet high, stems usually four-sided and the leaves are thickly distributed along it, the blossoms or flowers consist of a dense mass of yellow at the top. This plant is common along roadsides and in dry pastures, it grows very thickly and in patches. Golden rod is often gathered in quantities and makes a nice ornament, when several weeks old it turns white.

The grasses of fall are very numerous and varied, some of them are very beautiful while others are hardly

noticeable. The pampas grass is of course well cultivated and is found only in nurseries and private yards: it is a very pretty grass and grows usually to the height of five or six feet, the leaves are very long and narrow, growing up and bending over: there are two kinds the green leaved and the variegated, the latter is a pretty plant for yards and lawns. The bloom appears in early fall, growing on straight smooth stalks: when young they are small and of a reddish color, looking like long sprays or spindles: when cut and dried they open out full and form a beautiful plume, which naturally is almost white but may be colored any desired shade. The nursery patches of this grass have a beautiful appearance when full grown and in bloom.

Another pretty fall grass is a red species which grows by roadsides, in meadows and pastures: it grows about three feet high with narrow green blades, at the base upon the ground: the stems are bare with the exception of blades which are located at each joint, one in a place. This grass when young is about the color of the raspberry and is very pretty when it dries it turns nearly white and the little seed vessels open, if colored at this time it is very nice for winter boquets and vases.

The other samples of grass are numerous and more common, some varieties which grow like wheat are early and children often cut and bind it in play: this kind grows low, others grow in tufts and greatly resemble sea-weed or spray, this is very soft and is greenish red in color, while still others look so nearly like worms as to be sometimes mistaken for such, having round heads covered with hair. Some species have flat

compound leaves which look as if made of small green scales. Another grows very tall and the blossoms are rough and coarse with long bristles sticking out at intervals, the seed vessels of this species are hard and triangular looking much like small burrs or pods, the leaves are long coarse and nearly red, commonly found in gardens.

BERRIES.

These autumnal fruits of the wild trees, bushes and plants are very pretty as well as varied and interesting. The dogwood tree, (*Cornus Florida*) bears beautiful scarlet fruit, which is oblong and has a small brown tuft on the top—the remains of the departed blossom: these berries grow in bunches, usually three together at the junction of small twigs: when a small tree is ornamented with these bright berries, it presents a very attractive appearance, especially when the leaves are partly turned. If pulled and mixed with golden rod they make a nice boquet but turn black or brown when kept for any length of time. The Viburnum bush (*Viburnum Lantanoides*) forms a striking feature in the landscape of declining fall, they grow three or four feet high, with spreading branches which frequently take root thus forming a thicket of bushes and shoots, it is found in damp timber, the fruit is a bright red berry and contains a flat stone, it is divided and in form sometimes resembles a grain of guinea corn when popped. This species is not unpleasant to the taste, being warm and spicy. There are several varieties some of which are cultivated and also edible: when kept for a time the fruit turns black and loses its solid-

ity, withering up and becoming smaller. The Elderberry (*Sambucus Canadensis*) is also noticeable: the bushes are rather tall, stalks filled with pith, leaves seven to eleven, cymes flat: the fruit is dark purple and grows in bunches which are flat being the form of a leaf, they are small, round, juicy and sweet; they are much sought and are used in cooking. Skunk cabbage also bears large bunches of scarlet berries which usually appear in the latter part of summer; stem four or five inches long; fruit in a compact head, poisonous if eaten.

There are numerous other bushes also which bear berries, some are of a beautiful blue while some are black. The common Honey-suckle or Woodbine bears small fruit which is green in summer and turns rich black in winter. The Poke weed (*Phytolacca Decandra*) is an abundant bearer of berries, it is a large weedlike plant having a hollow stem, the leaf stalks and branches are red, found in low rich grounds flowering throughout the entire summer, the fruit ripening in autumn. Flowers white, stamens ten, the seed-pod divided into ten divisions containing one seed each. Berry rich purple, very juicy and often made into red ink which lasts quite well, fading when very old: if tightly corked when fresh it will force out the cork.

Our birds have a great feasting and reveling during the berry season, and it is chiefly these combined with the seeds of various weeds upon which the survivors subsist during the winter months when insect food has departed and the ground is covered with snow; how oft do we see them perched upon the top of a weed that is raised above the snow, extracting the seeds, so

it goes everything serving its purpose, be it high or low.

The Wild Rose bears fruit also resembling a berry; it is oblong, of a bright color and very hard and smooth, on the top is a vestige of the blossom, the fruit is divided into two or more cells each of which contains seeds.

The Persimmon tree (*Diospyros Virginiana*) also bears a large berry like fruit resembling a plum, it is green in summer and if eaten while in that state will contract the muscles of the mouth giving the face a contorted appearance: in the autumn after several hard frosts they turn red and are then edible. The tree belongs to the Ebony family and is the only representative.



THE COMPOSITE FAMILY OF FLOWERS.

This may be characterized by the flowers being compound; that is, several flowers composing a head, and surrounded by an involucre which is considered the calyx. The chief distinguishing mark of this family is the fact that its five stamens are united by their anthers. That which gives the whole head the appearance of a flower is that in most cases the corolla is strap-shaped.

In the Chicory Dandelion and all such plants the flowers are of this class, but in the sun-flower and others only those around the margin are such.

In the Sunflower these rays are neutral, having neither stamens or pistil. In daisies and asters the pistil and stamens are visible: these flowers or blossoms are so close and compact in the head as often to be taken for stamens. Some of these plants have a hairy or prickly calyx. The thistle is a very good example of this class, it is a well known plant growing in fields and meadows, it grows to the height of two or three feet and has a very rough stem and large deeply cleft leaves which are hairy. The blossom consists of a beautiful pink head, which when ripe has the appearance of a large cotton ball. The seeds each have a share of this cotton like substance, which serves to carry them far and wide for the purpose of distribution to other localities. Farmers usually try to banish them from their premises, so in well cultivated regions but few are to be seen while in wild districts, they are very abundant.

The Dandelion is another specimen of this class, it has not the rough prickly stem and leaves, but has the soft downy head; the flower is a bright yellow. It is one of the first to appear in the spring. When it withers away the downy substance is revealed, when fully grown it forms a round head of white, on a tall hollow stem, when blown they separate into small particles and by means of the sailing apparatus attached to each seed ascend into the air and will travel considerable distance. The leaves and stem of this species emit a milky juice when broken, and are sometimes used in making salad in early spring.

The composite family comprises about one eighth or a tenth of all the flowering kingdom, but is very difficult and tedious for study. The Golden rod which adorns the hills and dales in autumn with a rich color is a member of the Composite family, also Lettuce.

THE USES OF PLANTS,

The many plants which surround us are daily performing very useful duties and filling the offices assigned to them as their part in promoting the welfare and prosperity of the great natural universe. If one or two spokes in this great wheel be broken or disabled a change is evident upon the whole. Great and various changes are taking place among the numerous plants which cover the earth, although no visible action is noticeable. In the first place all plants have to live and derive sustenance from something. How they get it, and what it is that constitutes their nourishment forms an interesting subject for study. When a seed is planted in the ground it is hard and dry, and when covered up, action immediately begins; the moisture softens the shell or covering, and vivifies the embryo, which causes the hull to burst; then the roots proceed downward, and the head—or what in time produces the branches—upwards, till we see it peering through the surface, and ready to begin life after its fashion. We now have a young plant, which is, in comparison, hungry like an animal; they absorb moisture and nutrition from the earth, and the stem and leaves take in food from the air. When small the

whole plant is concerned in this gathering of food but when it becomes older and the stem toughens and hardens into wood, the leaf tips and small roots are the main agents by which the plant lives. That taken in by the roots is moisture and mineral substance, and that by the leaves mostly air, these substances are changed after absorption to suit the needs of the plant the mineral matter becoming vegetable: this earthy material which is taken in forms ashes when the bush or tree is burned. All plants renew their foliage yearly, falling off in autumn and being renewed in the spring, even the evergreen changes its coat, but not so noticeably, new spindles or needles are on their way while the old ones are falling. The life blood of plants is the sap, which flows through the system, following each branch and twig to its very tip, trimming or cutting a plant in the spring of the year when the sap is likely to prove injurious to its life.

The stems of plants are composed of a series of divisions or partitions, and the sap in rising one inch is said to pass through one hundred or more of such divisions.

Most of the nourishment laid up in seeds for future use is composed of starch, the larger portion of the potato is of this nature, also corn. If a grain of Indian corn be cut in two edgewise a good view is obtained of the starch also embryo. When such seeds are planted this substance turns into a mucilage which is used as nourishment for the young shoot when first escaped from its prison house.

What is the benefit of all this action? Does it have any effect upon animal life or the air we breathe?

Yes, the changing of water, air and earthy substances into vegetable material is useful, and in growth the vegetable matter is again wrought into many beautiful forms.

The one great service which plants render the animal kingdom is the purification of the air: this is the effect above referred to. When animals are breathing they take in oxygen which they need to keep the blood pure, and cast off carbonic acid: this is not fit to be taken again into the system, and were it to accumulate in the air to any extent animals could not live. This is where plants perform their great service: they need the carbon and absorb it, and it goes to their various parts and nourishes them, while the oxygen formed by the combination is given out fresh and pure, thus making a complete and thorough change in the atmosphere and keeping it in a state of purity by the constant circulation.

This is not the only way in which plants are and may be used. When large, like trees, they are made into lumber, which is absolutely necessary in the construction of buildings and furniture. Our best walnut articles, and also mahogany and rosewood, are all made from what was once a small weak plant. They also furnish us with tools and utensils, and an infinite number of other articles.

The greater portion of the food of man and the lower animals is furnished by plants. Considerable of the material used in the manufacture of clothing is obtained from plants, such as cotton and silk: the silk although made by the silkworm in reality comes from the fibers of the mulberry leaf upon which they feed.

Plants produce the entire fuel supply of the world: of course the trees which we burn are plants grown to maturity, and a great supply of burning material they furnish, independent of their numerous other productions and uses. But how is coal connected with plants. It is believed that the great and extensive forests which existed prior to the creation of man, became old and fell and many tons of leaves and twigs dropped together with other decaying vegetation, when all this mass of material sank and was buried in the earth, and underwent so many changes by reason of the condition of the planet at that period, that they were thus changed into the coal, which we now find in such quantities throughout the world. Thus we see that we could not live were it not for the great service rendered by plants.

A person going abroad and looking upon plants in the usual way would naturally think they were of no consequence except for beauty and adornment, but this is far from correct as will be seen on reading the works of those great authors who have made nature a study, and have furnished the world with much valuable information on this subject.

REPRODUCTION OF PLANTS.

This is another feature in plant life which is very interesting: it is accomplished by seeds, buds, shoots, runners or stolons, and by grafting. This latter process is mostly put into practice in the growing and raising of fruit trees: in this way wild species may be made to bear fruit like the one from which the branch

was taken. The seeds of plants are very different according to the numerous varieties which produce them. Those of the maple are good examples of those which are borne by the wind to various places: these have long thin arms or wings attached to them.

The study of seeds by themselves would be interesting as there are some which are very curious in form and color. Shoots frequently occur in trees especially, when all around the base of the old one little ones come up from the roots in great abundance. The lilac, shrub and althea are good examples of this class. Runners are very common; we can find an abundance of these in a strawberry bed, where, if they are not carefully cleaned out, they become so numerous as to form a thick tangled mass. The runner proceeds from some plant, and after running a little way takes root and forms a young plant. But it does not stop here, it begins again and would continue to do so if left undisturbed. The stolon is a branch which bends over and touching the ground takes root thus forming a new plant. The garden currant and Banyan tree are good examples of this class, the gardner can in this way multiply his shrubbery with more certainty than by seed planting. When a branch is bent over and has taken root the leaves on it serve as a beginning and it may be cut off and considered as an independant plant.

The climbing plants are worthy of study also: take a grape vine for instance, notice its twining tendrils: reaching out from a branch they grow until they encounter some object when the main tendril curls itself up thus drawing the branches closer to the grasped

support: in this way they can grow over empty spaces such as from one tree to another. The wild grape vine has very long branches but reaches from the ground to the tree tops where they spread out and form leaves. The most common species are the fox grape and chicken grape, which is the smallest of the grapes, the former is very large. Some plants have strong feet by which they are attached to objects.

Beside the families mentioned, there are many others which are interesting but difficult, the flowers being oddly formed and not easy to examine. The sedge family is composed of the sedges, clubrushes, bulrushes and like plants: these have flowers collected in a head or spike and are each in the axil of a single glume in the form of a chaff or scale. The flags and cat-tails are good examples of this class.

The grass family comprises an extensive division of plants, it is formed of the true grasses which have straw stems called culms, and leaves with open sheathes, it also includes corn and cereal grains as wheat, oats, rye, barley, and also sugar cane and broom corn. In descriptive botany all the particulars of plants and their growth divisions and uses are given. To do justice to the flora of our country would require a very large volume. The various names and descriptions which are connected with our flowers are very interesting, but in this little bird's eye view of the subject only a few of the most particular points are mentioned, but serve to incite an interest in them.

Plants like birds and insects are distributed in all parts of the earth: some which are not found in one locality are represented by other species of equal inter-

est. Among the most curious are the air plants, which live entirely on that element having no connection with the ground; neither take nourishment from the tree upon which they happen to grow. Many beautiful specimens of this class are found in warm climates.

THE FLOWERS.

At the coming of the spring,
The flowers reappear;
And with their scent and colors
Fill the earth with cheer.

On the warm and sunny bank,
The violet rears its head;
And the pretty buttercups
Spring from their leafy bed.

We find them in the lonely valley,
On the wild and desert hills,
In the rich and verdant meadows,
We find them by the sparkling rills,

And many a desolate landscape
On whose rocky crest
The morning sunbeams play,
Is blest with pretty flowers
All through the summer's day.

When rambling through the woods—
Vibrating from Nature's Band;
We love to find the flowers
And pluck them with our hand.

And the lovely humming birds,
Bright fairies of the air;
Poise themselves in front of flowers.
And feast on honey there.

And the roving insects,
Are flying to and fro,
To find out where the sweetest
Of blooming flowers grow.

Away to the fields and meadows
In these sunny hours,
By the brooklet's winding course;
Away in search of flowers.

And so it is with us,—
Though toil and care be ours,
We find lives troubled pathway,
Strewn along with flowers.

—*Berton Mercer.*



PART III.

INTRODUCTION TO INSECTS.

The family of insects is very extensive as well as interesting, the species are numerous, such as bees, wasps, butterflies, worms and flies of several kinds. They are classified or divided according to their habits, food and location. This division of the Natural Kingdom as well as others is variously distributed over the earth, some being found in certain localities only, each part of the world having its peculiar insects. The bodies of many of them are divided as follows: head, thorax and abdomen: it is from this that they derive their name, (secto) meaning cut. There is as much beauty and curiosity about these creatures as about birds or animals: some of the most gorgeous butterflies are found in the Old World. The tropics of America, are also gifted with many beautiful specimens of these fairies of the sun. The temperate regions also have their share. Many insects are injurious to trees and shrubbery while some that are accused are harmless. A careful study of natural history will lead to the capture of the guilty and the protection of the innocent.

Beetles are a very interesting class of this family; the wonderful formation of their bodies, and the many ways by which they obtain their food are deserving of our notice. The grand coloring of their wings in some cases defies all attempts of the artist to make an imitation. The constant hum of the bee, the sharp screech of the locust, and the evening songs of the cricket and katy-did are familiar to all and are a fair sample of the voices of insects. Many of them are silent.

BEETLES.

This class of insects is very numerous and interesting, and are more commonly called bugs. Some of these are very curious and deserve our notice while others are not very noticeable. The chief characteristics of these insects are hard wing covers, strong flight and great strength. Some of the most common are the Tiger Beetle, Pea-Weavel, Nut-Weavel, Tumble bug, Spring Beetle, Snapping bug and the larger bugs so well known as pinching bugs.

The Tiger Beetle is one of the prettiest of the tribe. The wing covers are rich indigo, green and bronze, which show to a great advantage in the bright sunlight. It is a fast runner and may be seen during warm summer days, running along in the dusty road in which it delights. The Pea-weavel is small and is dressed in a dull gray garb slightly spotted. It is very familiar to the gardener and may be seen in seed peas in early spring, making little round holes in them and leaving the shell, these little bugs sometimes completely riddle a crop of seed peas, but they grow occasionally when partly eaten. The Nut-Weavel is considerably larger than the preceding species: the chief characteristics being the long drill like snout which is used in cutting through the shells of nuts and the partitions between kernels. The Tumble Bug is one of the most curious of these insects particularly in its habits: it receives its name from the way it has of rolling up little balls of dirt in which to deposit its eggs—that from the barnyard is mostly chosen: when the ball is sufficiently large they bury it, and lay their eggs in or upon it;

as soon as hatched the larvæ begin to feed upon the surrounding covering. These beetles are quite large and have strong wings which are black. The wing covers of bugs are hard while the wings proper are soft and net like: there are usually two pair of them. The Spring Beetle is very curious. There are two species one considerably larger than the other. The small one is quite common and may be easily recognized from the habit it has of springing or jumping up into the air when touched. Its back is wonderfully adapted to this purpose, having a strong joint or hinge, which when worked throws the bug some distance. Its body is long and narrow, of a dull brown color, legs very small. The large species is somewhat rare, and from an inch to an inch and a half long. The body is quite hard; color, black, thickly spotted with white. On the head are two large eye-like spots, black, with a white ring around them. The true eyes are very small, and are situated low in the front of the head. This beetle has the jumping powers much more strongly developed than its smaller relative, being able to spring three feet from the ground. The legs are long and rough, the joints being prickly.

The pinching bugs are large and strong, particularly their jaws and arms, which when tampered with, are usually put to use, much to the discomfort and surprise of the meddler. They are sometimes found in great numbers about rubbish and carrion.

The carrion beetle is very large and as its name indicates, feeds upon dead and decaying substances. They are not often seen unless something of this kind is near. Their wings and bodies are usually black.

The sexton beetle is a very interesting species. Its peculiar habit of burying dead bodies which it finds, gives it its name. When one of these bugs finds the dead body of a bird or frog it immediately proceeds to remove the dirt from beneath it, and if the body should prove too great for its strength it goes in search of others of its kind, when they all turn in and work very diligently until the burial is completed.

Some beetles are as large as walnuts. The wing covers are sometimes ridged or grooved; the legs are strong, and the feelers or antennæ are sometimes tipped with a small knob. If anyone wishes to see a number of bugs of all sizes and colors just turn up a board that has been lying on the ground for some time and your curiosity will be satisfied. They will be seen skipping in various directions.

The fire-fly which is so common with us is another interesting specimen, though more of a bug than a fly. They may be considered as part of the summer scenery for there is scarcely an evening but it may be seen flying around emitting its bright light from under the wings.

Beetles and bugs are much sought for collections by naturalists, as well as butterflies and moths. Some of the most beautiful come from the old world, although America can well boast of her possessions in this line. There is a small beetle well known to cabinet owners, for it creates disaster among his collection of stuffed birds or animals; and eggs also, do not escape this little destroyer, for he eats the inside skin and part of the shell, so that the remainder will soon collapse. This bug is not much larger than a pin head, and most

every one seeks his destruction. In color it is dull brown. There is sometimes another associated with it, with small red spots upon the wing covers. Beetles undergo changes during their lives, the same as butterflies. Their change is sometimes called the resurrection from the dead, which seems very appropriate to this wonderful freak in nature. The larvæ of the apple-tree borer is very destructive to fruit trees, boring galleries or tunnels through and through the tree, so as to render it feeble and worthless, and in process of time the tree decays and falls, and is fit for nothing but to burn.

The little lady bird is another one of the beetle family. It is a beautiful little creature, the wing covers being bright red marked with a few black spots. This is the bug that the nursery rhyme was based upon, and which some of us are so familiar with. The habit that beetles and other insects have of flocking to our lamps is well known, and many of them lose their lives in this foolish practice. There are thousands of others both small and great, which are too numerous to mention separately.

BEES AND WASPS.

Bees are of great use to man, both the tame and the wild ones, supplying them with honey, which is highly esteemed for food. Our bees live in hives or boxes which are prepared for them. They make a large structure of wax called a comb, in which the honey is deposited, it being gathered from the summer flowers in the shape of pollen or dust, which they carry away

to their homes in little hollows in their hind legs. These little hollows are sometimes called baskets, which they fill and fly away and empty them; then return for a fresh supply, and thus continue throughout the good weather, and when the cold winter comes, like wise people, they can live comfortably from the proceeds of their summers work. This is a good example of the wonderful instinct given some insects. They are ruled and guided by a monarchial power, having a queen at the head of their colony, and her commands are law. If the queen die and there are no young queens to take her place, the bees sometimes all die of grief, or quit their work and leave the hive. The bees are divided into three classes: the queen, the workers and the almost useless drones which do nothing but live off the industry of the workers. These drones are the largest of the three.

Sometimes bees swarm or leave the hive and fly away to the woods or some hollow tree. In such cases it is very difficult to regain them, and sometimes impossible. The battering of tin pans is often resorted to as an effort to bring them back. If an empty hive is placed by the old one, in time they are likely to resort to it in place of taking wing and wandering off to some woods.

Hive bees are small, of a brown color. Their wings are transparent and show the little veins of which they are made. Their eyes are large and placed very near each other at the front; they are compound in structure and have a smooth glassy appearance. A small pointed proboscis is placed before the mouth.

Bees when provoked are dangerous foes, being able to sting very quickly. It is said that if a person is stung in a vital place by a bee they will die, showing that their sting is not to be trifled with. There are some small honey bees which live wild and may often be seen inside of flowers searching for food. When flying all bees make a humming or buzzing sound which makes a part of our familiar summer sounds. The history of wild bees in their haunts is very interesting, beside their connection with the natives who run the risk of their lives in hunting and securing their honey which is made in hollow trees in the depths of the wild and luxuriant forests. The way the natives secure their booty is by arming themselves with a hatchet or axe and a large torch made of straw or hay, and a large strong rope, which constitute the outfit. After finding the nest they climb the tree and suffocate the occupants with their burning torch. When this is done they chop away at the opening till they can get at the contents, which they carry away in triumph. This seems like hard usage for these little workers who have toiled so hard and long in laying up their store of sweets. In connection with this subject it might be stated that in the tropical regions there lives a little bird known as the Honey Bird, which is well known to the natives, and is of great use to them in finding the nests of wild bees. It is a mystery that has never been clearly solved, but these tiny birds seem to know where the bee's nest is, and what is more, they lead the natives to them, their idea being to get some honey, for they are unable to get it themselves without superior help. So when they have found the prize they

manage to attract the people's attention, and they follow the birds, doubting nothing, and when they reach the spot the bird guide sits coolly by on some neighboring branch and watches the proceedings, and when the honey is secured and the people are about to leave, they always fix a large piece of their spoil in some bush for their little feathered friend, which has thus rendered them valuable assistance. They deem it a great abuse not to leave any for the bird, and if they cheat it in this way it sometimes leads them away into the forest where there is no nest.

The large humble bees are well known to all and their familiar hum is not unpleasant, as they pursue their aerial circles on nice warm days. Their bodies are black except some woolly fur on their thorax which is green or yellowish. Their honey baskets are quite perceptible, and when filled with pollen are very curious, looking like large yellow legs. Their nests are mostly placed upon the ground in tall grass or in rail heaps or small holes. When their home is torn up or disturbed the owners get very angry and the author of the disturbance had better take to his heels if he does not wish to have some very unpleasant feelings about the face and hands. The sweet odor coming from one of these nests indicates that there is something good inside. There are two kinds of humble bees, one of which does not sting. This is well known to children who delight to play with and handle the white-heads, as they are called. These have a small yellow spot upon their foreheads, from which their name is derived. The others have black all over their heads and are fierce stingers.

There is a small humble bee also, which may often be seen sucking the juicy sweets from flowers. It is very amusing to see a large bee come and push into the mouth of a closed morning glory and stay till satisfied; then come out backwards. When the flower is long stemmed such as the foxglove, the bees pierce the flower tube with their proboscis and secure their meal in this way.

Hornets and yellow jackets might be treated upon under the heading of bees and wasps. Both these are dangerous foes and when disturbed prove very troublesome. Hornets are large with a black body encircled with a number of white rings being showy as well as pugnacious. They make their nests very large, formed like a rough ball with but one opening. The interior is made much on the plan of wasps nests, they being one above the other, making several stories. The nest is sometimes placed on a low tree in the woods, or in some old building. The yellow jacket is much smaller than the hornet but has an equal amount of pluck. Their bodies are bright yellow, encircled with a number of black rings. Their eyes are also black. They make a nest the same as the hornets except smaller and is more conical in shape. It is placed in a box, under steps or in the gable of a building.

There are several species of wasps which are interesting to the observer. The common brown wasp and the blue mud wasp, together with many others; also some insects which look much like wasps but are really flies. The wasp does not provide for its winter wants as does the bee, but feasts and revels during the summer, and when severe weather comes many of

them die of starvation and others of cold. They live mostly on fruits, stinging and biting them in a way that is very destructive to them. Grapes when wilting or growing old are always full of wasps. The divisions in their bodies are very distinct, the joints being scarcely larger than a pin. Our most common species, the brown wasp is very abundant in fruit time especially. During the early part of the warm season they are engaged in making their nests and raising their young.

One very interesting feature about the wasp is that it is positively the first paper maker, and from which man first learned the art. The nest is usually round and composed of a rough paper which they make by chewing fibers from a piece of wood, then they mix it with a glutinous substance from their mouth. When well mixed it forms a kind of pulp which when exposed to the air immediately becomes stiff. With this they make a very neat home. The nest is full of cells which are four sided. In each of these cells an egg is deposited. The young are very curious, looking more like a white worm with a brown head than a wasp. When some days or weeks old legs and wings appear and the eyes are more matured. The nest is usually placed upon the branch of a tree in the woods. Small boys delight to stone them down but they always take due care to be at a safe distance when the wasps leave to avenge themselves on their enemies. In the latter part of summer the brown wasps congregate in large numbers and fly around and make themselves familiar with everything within their reach.

The mud wasp is truly beautiful, being a rich azure blue which glistens with many different hues when the

sun shines upon it. The wings are very smooth and silky. Their flight is quick and irregular making a slight buzzing sound. The chief point of interest about these insects is their mode of constructing their nest, it being composed of pure mud which they have kneaded with their jaws at the edge of some ditch or pond and then carried mouthful at a time to the place where they make their residence. The nest is divided into two or three long cells with hard mud partitions. In the bottom of each cell an egg is deposited: then the remainder of the cavity is filled with the bodies of dead spiders which the old wasp catches and kills with great dexterity. It is truly amusing to watch them go to a spider's web and shake it with their feet, and when the victim comes out expecting to find some prey entangled in its trap, it is seized by the wasp and borne away to the nest. When the young wasp has eaten all the food thus provided it is almost if not quite able to shift for itself. They will renew the nest several times in one place, if taken away or destroyed, they being good masons.

FLIES.

Probably every one knows what flies are, but the most common of this tribe is the house fly, and it is often spoken of as though there might be no other kind. There are, however, numerous other species. The Hessian Fly, for instance, which is so destructive to the wheat crop, makes great devastation in fields when they come in numbers. They are natives of Europe, and are supposed to have been carried over to

this continent by emmigrants, either in the form of eggs or larvæ.

The Ichneumon Fly is a very curious specimen, having very long legs, and also an exceedingly long ovipositor, with which it lays its eggs in deep, round holes in the ground which are made by another insect as is the case among bees,—the carpenter bee bores the hole and others live in it. There are large flies which lay their eggs upon or in meat and other substances, also a species which lays in incisions on the backs of cattle and when the eggs hatch the young feed on the flesh of the poor animal and causes great pain and sometimes death. The horsefly is a large and cruel species which are a constant source of suffering to these noble beasts during the summer and early fall. The largest of these is green and has a woolly body.

The mosquito might be considered as a fly. Scarcely any description need be given for it is well known by its stinging propensities if for no other reason, the weapon with which it sucks blood when magnified is shown to be a small lance protected on either side by a shield which closes when not in use. The flight of this insect is always accompanied with a ringing or singing sound which is a warning of its approach.

SPIDERS.

Doubtless this class of insects attract more general notice and study than most others. Their bodies are woolly or hairy; their legs long, and most of them make webs, some of which are beautiful. Our common little brown and black spiders do not exhibit any extra

mark or taste upon their homes, being loosely spun in any crack or corner that comes handy, they of course concealing themselves in the back part, and when an unlucky fly gets entangled in the meshes out comes the spider and wraps a few more of his silken threads around the victim, and then retires to devour it at his leisure. The geometrical spider makes a very complicated web, somewhat resembling the figures and lines used in geometry, from which it derives its name. The handsome webs of this spider may be seen in great numbers on a dewy morning, when the entire landscape appears covered with one vast network of silver cords or lace. The material of which the webs are made comes from their bodies. Before it comes in contact with the air it is in a fluid state, which hardens when spun. It is interesting to observe one of these insects at work, how the frame-work is made, then how they go round in circles making them smaller every time as they near the center; and how dexterously they fasten the threads at their junctions, and spend considerable time in running stays or braces from the main web to the nearest trees, or other objects. The construction is very wonderful.

The trap-door spider is another curious member of the spider family. Its name is derived from the dwelling in which it lives, being a hole in the ground well lined with soft materials, making a very comfortable abode for the little creature. The entrance is by a lid or trap-door which operates on a hinge. When hungry they come up to the mouth of their house and raise the lid a little, and there sit till something comes along which they relish, when they at once pounce upon it

and devour it at their pleasure. A comical sight is to see one sitting in his doorway with the lid propped up. When out on a ramble in summer you may see a large spider hanging in his web on a tree, his body very large, bright golden yellow, being variously marked with black and red, and occasionally some blue. This species is poisonous, and does not make a very extensive web, it being a small net work in the center, surrounded by long radiating threads which are fastened to neighboring objects. In and about the tropics are some very large spiders which are highly colored and poisonous a bite proving fatal.

Some spiders spin a little silken bag, in which they deposit their eggs. When the eggs are hatched, if the bag is broken myriads of minute legged creatures come pouring out and over the observer.

ANTS.

For industry and economy there could be no better specimen of the insect tribe selected. Who is there that has watched the ant in all its various daily duties but what can verify this statement? It is wonderful the amount of material it excavates and carries in its jaws, and what large and strong houses some species make. Most ants live in the ground, while others live in mounds or nests on the surface. There are several kinds of these insects, the most common being the little brown ant, which is constantly seen except in winter.

The large black ant may be seen in great numbers running up and down the trunks of trees and speaking to each other as they pass. The small red

ant is not uncommon. The species in the hot climates are very much larger; some of these are white. The home of our brown ant is well known being in small round holes in the ground which they make with their pincher like jaws carrying little particles of dirt one after another till the nest is completed: they work with great earnestness and pass in and out without any inconvenience to themselves. A fight sometimes takes place in which they show great bravery. Frequently the battle is between two individuals, while at other times it is between large numbers or colonies. After such battles, which are always very fierce, the ground is strewn with the dead and dying, much corresponding to the deadly contests waged between human beings. The dirt which is brought from the holes is deposited on the ground around the entrance, thus forming a heap or mound known as ant-hills, which are small. The cells of the red ant are very small, artfully constructed, and much the same in appearance as those of the brown ant.

The homes of ants are generally in groups, several hills being within a small space. The black ant is much larger, and is particularly fond of running the trunks of trees, there being a constant traveling both ways from top to bottom. Very often birds, such as flickers and other woodpeckers, come and firmly fasten their long toes in the bark, and then commence eating the ants on both sides of them, as they pass within their reach. These black ones are capable of inflicting very unpleasant bites, their pinchers being very sharp. The home of this species is also in the ground. They mostly select a grassy place and cover a large space

with their big hills, and so completely do they riddle the soil that the whole area occupied by them is one soft mass of small particles. Thus they injure the ground. Scarcely anything will drive them from their fortified rampants. Ants may often be found under the bark of decayed wood, together with great numbers of eggs. When any disturbance takes place they hasten to the eggs, seize them in their mouths and transfer them to a place of safety. Great care is taken of these eggs. It is said they carry them out into the sunshine, in good weather, and back again in the evening, and at all times guard them from harm. Birds, ant lions and several species of animals prey upon ants.

The tropical ants live in large houses or nests which they construct with their own labor. These are sometimes made of mud, and sometimes of sticks and rubbish. The outside is very hard and smooth; the interior is full of galleries and rooms, which are used for various purposes, some for store rooms and others for living in. These insects are good house builders, their homes being very large, often several feet high, around which are stationed sentinels or watchers, whose business it is to look for danger, and as soon as any is observed, they at once make it known to the army, which they always keep, who instantly rush out and make war with the enemy, sometimes conquering and sometimes surrendering. If the foe get the best of them they destroy the eggs, and either tare down the houses or take possession of them for their own accommodation. These ants are very troublesome to the people who are strangers to the climate and surroundings.

Some of these tropical ant-hills are so large and numerous that the colony of their houses resembles a small village. When travelers approach the mounds the inmates come out in a great rage, and do all in their power to molest them. Some ants are winged and are able to fly like other insects. These little ants are great for carrying or dragging things they have found to their homes. Often may they be seen drawing something three times larger than themselves, but they get along very briskly: taking hold of the object by their mouth they bear it away, sometimes going forwards, then backwards, then sideways over grass or other object until they reach their destiny.

In connection with ants it will be proper to mention the ant lion, which is not a large beast, but a small bug-like unpretending insect. It is more frequently met with in dusty places, where its little pits may be found, several of them together. The insect is rather small, of a dirty brown color. It makes pits in the dust the shape of a funnel, narrowing at the bottom, where the little lion hides himself; and when an ant or other small insect falls into the pit he springs out of the dust and devours it. The smoothness of these pits is remarkable, formed in the dust as they are. There is nothing very attractive about the owner, but his trap is interesting. Nature's law is always carried out. Where anything is deficient, it is abundantly made up in other ways.

SCORPIONS.

These are very formidable and dangerous insects, especially the larger ones. They are very plenteous in

hot climates and infest the dwellings of the inhabitants, crawling all over the furniture and other articles. Some species are very poisonous. Some have a sharp sting on the tail which they make free use of in defending themselves. When molested it curls the tail around towards the intruder. There is a large lizard which eats these scorpions and it is amusing to see the pains it takes to secure the sting. When this is done the insect is powerless. The lizard creeps up behind and places its foot upon the weapon, then eats its prey at leisure.

Another insect similar to the scorpion is the well known centiped or thousand legs, which can run very swiftly.

BUTTERFLIES AND WORMS.

These two insects may well be treated together, as one turns into the other, and most worms are really butterflies in their larval state. This is one of the most wonderful changes made in the course of nature. It is very interesting to get a caterpillar of some species and feed it and observe the various stages which it goes through before becoming a perfect insect. Butterflies are very beautiful insects. Some of them are exceedingly beautiful insects, some are exceedingly high colored, particularly in the warm regions and the Old World. Some of them last only a few days and others for only a few hours. They lay eggs which when hatched are in the larvæ form and after living for some time in this state and being well fattened and full grown they spin their cocoon of silky substance mostly and go to sleep or turn into a

torpid state and remain in this condition various periods, according to the species. When the time has expired for their sleepy condition, the insect, now a butterfly or moth, eats a hole through the end of a cocoon and comes forth in a perfect state. They usually sit still for some time afterwards in order that their wings may become firm and dry, then they wing their way in search of their most beloved flowers, and rally in the sunshine for a while, then die. It seems like a very short life after so long a stage of changes. The butterfly has its antennæ long with a knob on the end, while that of the moth is feather like and downy. This being a distinguishing feature of all species of each. Moths fly mostly by night. The wings of these beautiful insects are covered with a substance which when viewed through a microscope proves to be little scales neatly and closely laid. So small are they that to the naked eye it appears like fine powder or dust. You cannot touch a butterfly without rubbing this powder or scales off. When these scales are all removed the wing resembles a thin transparent membrane having several ribs or stays.

Butterflies and moths have a long tube through which they suck the juice of flowers. When not in use these tubes are coiled up under the mouth like a fine watch spring. Some of these are large as the five spotted sphinx for example. Their bodies are usually covered with fine downy hair. The species are very numerous. Some are very large and attractive while others are small and unpretending. Various species measure from four to six inches when spread. A few of those we more commonly meet are the small yellow

butterfly, also one of the same size having white wings. The brimstone, the azure blue which is very small, the missipius, the swallow-tail and thousands of others are beautiful and interesting. The common moths are the five spotted sphinx and the hawk moth. The yellow butterfly is very common being seen in summer in little groups along ditches or by damp places in fields or roads. The body is small, and the wings are sulphur yellow, with a small black or white spot near the tip, also a little black along the body. The white wing is the same size and form. The Mount Washington butterfly much resembles these. The brimstone is small and dull rusty red, with but little marking. It is common in summer and may be seen flitting among the clover heads in the fields and yards. The azure blue is about the same size and is a uniform pale blue. These two species may often be seen together flying near the ground and alighting often. The red admiral is considerable larger the wings are a beautiful red with some black markings.

The swallow tail is handsome. Its wings are about four or five inches across and are a beautiful yellow with a black margin and four black spots on each pair of wings; Those on the rear pair have some blue mixed in around the edge. The rear pair of wings are beautifully tailed with black. The body is yellow encircled by black rings. The missipius butterfly is produced from the celery worm which is characterized by its yellow horns. Its wings are about four inches in expanse, color nearly black with red and white markings. It is not very common. The skipper is characterized by the jumping manner in which it

moves from one place to another. The five spotted sphinx is a beautiful moth. The body about three inches long is thick and tapering to a point or nearly so. Head large, also the spiral proboscis before mentioned; wings about five inches in expanse; the whole of a uniform gray, intermixed with black and dusky markings, while along the sides of the body are five bright orange spots, from whence it gets its name. The larvæ of this species is the well known tomato worm, which is about four inches long, of a light green color, with white oblique stripes across the body and a red thorn-like projection on the tail. The back of this worm is covered with small oval white cocoons in which are the eggs of a certain insect, which when hatched penetrate the back of the worm and eat its flesh, often causing its death. When full grown it enters the ground and forms a cocoon with a handle similar to that of a pitcher. When the moth emerges it mounts the nearest object and dries, and stretches its wings, and when the shades of night are falling it wings its way to enjoy a few hours or days in its perfect state.

The lady-bird moth is a curious object, forming what might be considered a connecting link between the moths and humming birds, for it somewhat resembles the latter. The body is soft and downy, with a short flat tail, which looks as if composed of minute feathers. This insect is a uniform brown color. When sucking honey from flowers it poises itself in the air as the humming bird does. It generally flies during the twilight of summer evenings. Something is going all the time. When the sultry day is gone and its charms

retire to rest, a new set of creatures come forth to gladden the scene and to take their turn in revelling and food gathering. One of the British moths which is called the Death Head is the source of great terror to some of the unlearned and superstitious people who imagine it to be a shure warning of some deadly calamity. It is a beautiful moth, and is perfectly harmless.

The secropia moth should not be omitted. It is a fine large species, with beautifully colored wings expanding five inches or more. The antennæ are large and well formed, the feathery appearance being excellently shown; its colors are somewhat the same as the promethia, being a mixture of rich dark shades, nicely blended together. The cocoon is very large and appears to be made of a silky brown paper, which is exceedingly tough and rattles when touched. They are generally placed upon a small twig or branch, and are larger at one end than the other, tapering down to a point where the insect emerges, and leaves a hole with soft brown fringe around it, where the moth had eaten away the covering.

Butterflies and moths comprise a part of the scenery of summer, flying gracefully through the air, or poised upon some choice blossom or flower, obtaining the sweet juices which they afford. When settled upon any object they gently raise and lower the wings, giving the observer a general view of the upper and lower sides of their delicate pinions. Some of these insects have light or silver colored wings on the under side, and when touched your finger is covered with a fine dust which has a metallic appearance. Butterflies are much sought, and moths also, for the cabinet, and a

large and well arranged collection present a beautiful appearance when the wings and feet are set as in life. In collecting these delicate fairies of the sun great care is necessary, that the limbs are not broken or the wings divested of their rich colored scales.

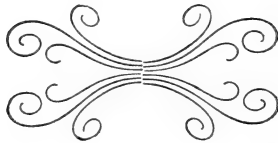
Another moth with which many are familiar and all should be, is the silk worm moth which is very beautiful. Its body is covered with silky hair. Their color is rich bluish drab variously marked with black and white. It is not the moth that is to be noticed so much as the larva which produces it. If it were not for this worm and its labor, one of the leading articles of commerce would be missing, which is silk. When the caterpillar is full grown by feeding upon mulberry leaves it spins a large cocoon of fine silken threads. These cocoons are gathered in great numbers and heated to a certain temperature to kill the pupæ. The silk is then taken off and wound up ready to be spun, colored and transported by our factories and mills. The raising of silk worms has become an industry of great importance. Some persons have planted large tracts with their favorite tree for their own accomodation. Sometimes as much as 200 yards can be obtained from a single cocoon of this valuable species.

The promethia moth is a common and beautiful specimen. Its cocoons are small and may be found in small numbers in swampy places where there is a considerable amount of undergrowth. They are usually seen hanging from a small branch. The cocoon is very hard and is enclosed in one or two leaves which are wrapped around it and are firmly fastened. Their

length varies from two to three inches or more. The moth is dressed in plain colors but they are rich and tastefully arranged. The wings are gray with rich brown and black markings. There are also four beautiful spots.

Among other insects which are valuable to commerce, the cochineal must not be forgotten. This insect is a very small bug-like creature, of a bright red color. Their bodies when dried and used in a proper manner yield a rich dye which is a well known and extensively used in manufacture and coloring. Another is the coral insect, which is minute in size but powerful in deed and action, large tracts of land being raised to view or caused to disappear by the action of these exceedingly small creatures. In the oceans and seas this insect makes its home. It always lives under water and when submerged flourishes. The material of which the coral islands and reefs are formed is composed of the dead bodies of these insects. They sometimes raise islands in the ocean. A few of these are solid while others sink so low in the center as to go out of sight and leave only the edges showing. These are called coral reefs. There are two kinds, fringing reefs and barrier reefs. These coral formations are of a limy texture and are of several colors, the principal being red. This is used to considerable extent in the manufacture of chains, necklaces, breast-pins and other ornaments. The coral insect we see produces changes in the land as well as water, earthquakes and other natural phenomena.

Crickets and katy-dids form a chief part in the insect music with which we are familiar. Their song is not produced by the mouth as was formerly thought, but by a thick hard membrane on the back at the root of the wings. In autumn the harsh cry of the cricket is one of the characteristic evening voices.



PART IV.

INTRODUCTION TO ANIMALS.

Aside from what has already been described there are many other creatures which we see, when on our daily rambles, the chief of which are animals. Without undertaking to do justice to the subject or describing many of their species, I will mention a few of those common in our own land.

The animal kingdom is very large and varied and comprises many species. Some of them are tame and docile, while others are wild, savage and ferocious. Some feed upon vegetable food, others upon animal. Even man sometimes falls a victim to some of the large carnivorous (flesh eating) species. Many of our animals are useful in furnishing fine furs such as are used in the manufacture of costly fur goods, among which rank the beaver, seal, otter, martin, mink, sable and others. The collecting of these furs was a chief employment and source of profit to the Indians. In the time of early settlement these natives, when they were sure of the white man's honesty, would trade their furs to them for other articles which they wanted. The names which the Indians gave some of our animals are very interesting, and many of our rivers and lakes still bear the names which the red man gave them before the white man ever set foot upon American soil. Many are the stories told and left on record by the hunters of these wild denizens of the forest. Some of these are romantic and beautiful, others thrilling and perilous. The best furs are procured in the northern and western United States.

THE RABBIT.

Our common rabbit is a very comical little creature. He sits on his haunches, listening when he thinks danger is near. This animal is sometimes called a hare. The color is gray mixed with brown above and white below. The tail is a mere bunch of fur. They have nests in the grass and burrows in the ground, but they usually depend upon their speed for safety. They often sit still until you are within a few feet of them, then with a sudden leap are gone. The ears of the rabbit are long and lay back flat upon the head. The eyes are large and placed in such a position that they have a range of vision almost all around them, thus making it very difficult to approach them unseen. The young of the rabbit are truly beautiful. While taking a walk one summer I found two very small ones. They seemed quite tame and permitted me to stroke them. Their food consists chiefly of grass, leaves and bark from young trees. They often come to our gardens in search of cabbage of which they are very fond. Young trees are sometimes divested of their bark by these animals in a manner which is likely to prove injurious to both the tree and rabbit; for the trees usually die and the rabbit is likely to follow suit if he gets within the range of the farmer's trap or gun. Rabbits are much prized for food and every winter brings destruction to a great number of them. There are several species, some of which are white. English rabbits are very pretty. In color they are white and bluish drab. They are usually kept as pets, but their house must be secure as they are great diggers, often burrowing under walls and thus effecting their escape.

White rabbits almost invariably have pink or red eyes, making a contrast with their general color.

Some rabbits which live in the far north change their color to white which corresponds with the great snows which abound there, thus making a special protection against hawks and other enemies which it has. For the same reason the fur turns brown again in summer. This is one of the many wonderful changes which occur in nature for protection or oddity.

Rabbits were introduced into Australia for the purpose of food and to lessen the cruelty of the natives toward one another. For a time the purpose was very well carried out, but before long the animals became so numerous as to be a nuisance, eating up nearly every green thing upon the continent and so completely filling the ground with their burrows as to render it almost unfit for traveling, especially with horses as they would sink through the surface.

I once read of a rabbit which made her nest between the rails of a double tracked railroad where many trains were daily thundering over her at a terrific speed. But undaunted, however, there she made her home and raised her four baby buns in peace and safety. She would bring them out, when the track was clear for a frolic.

OPPOSSUMS.

(*Didelphys Virginiana*.)

Although we do not often find this animal by day when in the woods, yet it may be caught and studied with satisfaction if desirable. It is about the size of a large cat, is gray blue in color and has a long pointed nose. The teeth are small and numerous. The tail is

long and has a scaly covering similar to the rat. It is very flexible and the animal makes good use of it in climbing among the branches of the trees. It also suspends itself from the limbs at pleasure. It is a nocturnal animal, sleeping through the day and coming forth at night in search of food, which consists of eggs, small birds, and other fowl. They are great travelers and usually scour a large area of country during the night. When approached they always feign death and appear altogether lifeless, but should the observer go away for a time they quickly get up and make off. Their speed is not very great. Their home is a hollow tree in the woods. Sometimes a number of them live together: especially is this the case in the south where there are many of them and where the hunting of them is a source of much enjoyment, pleasure and excitement. Being done in the night and accompanied by torch-light the merry hunters make the forest resound with shouts and laughter. They are highly prized for food by some persons. The flesh is said to taste something like pork. Their skins are used in the fur line.

SQUIRRELS.

(*Sciurus Europaeus*.)

These are beautiful little animals and may be seen at all periods of the year, but of course more frequently in the summer season. Their bodies are long and slender and are covered with fine fur. Their tails are large and bushy. This family lives principally upon fruit and nuts which they gather in summer in large quantities, and store away in some hollow tree, for use

in winter when the ground is covered with snow, or they would be unable to obtain their food, a very wise plan for them to pursue, indeed a much better one than some of his superiors have. They live mostly in and about the woods where they may be seen most every day in warm sunny weather. When autumn arrives and acorns and other nuts are ripe, there is quite a stir among them, and a person can scarcely go near a wooded district without seeing them running in all directions with their cheeks pouched out, owing to the big mouthful of provision which they are bearing to their winter quarters. In summer squirrels have large nests in the woods, which are generally placed in the top of a small tree and are coarse and bulky, being composed of sticks, leaves and grass. Some squirrels migrate in large companies from place to place, and when a stream is to be crossed it is said they select pieces of bark and sit upon them, thus sailing safely across without getting their coats wet at all.

Most if not all of our squirrels are suitable for food, and they do not fare much better than the rabbit when the time expires in which the law prohibits their destruction. There are several species of these interesting little creatures—the gray, red, flying squirrel and others. The gray species is the most common. He is very active, and can run up or down the trunks of trees with great rapidity, and also leap from one tree to another where the distance is not too great. It is amusing to see them go out on a limb until apparently in danger of falling to the ground, and then nimbly jump to a neighboring branch, running to the top and looking saucily down upon you. This is the squirrel most

sought for food. On warm days in winter he comes out from his snug little abode to look around and get fresh air and sunshine. A pretty sight is to see him sit in the fork of a tree with a nut between his paws, eating and throwing down the hulls as he goes. Usually where there is a squirrel retreat the ground is litterally covered with hulls. Think of him eating through the hard shells of the hickory nut. His teeth are especially adapted for the purpose, as the beaver, its teeth being fitted for hard and incessant gnawing which they undergo in cutting down the trees with which they build their homes. When near enough their abodes, in winter they will come near a dwelling to procure an apple core or other object which may be thrown away.

The red squirrel is considerably smaller than its gray cousin, and is of a rusty red color. The tail is not so large and bushy; the breast is grayish white. He is not lacking in activity or climbing powers, and is full of play and fun, but has also a share of querulous temper, being somewhat spiteful sometimes. He is a source of trouble to birds. Often have I seen a robin chase him around and around the trunk of a tree, the bird no doubt being in a high state of excitement and anger, while the squirrel takes the whole as a matter of fun, and of course gets the best of the bird every time, owing to his agility. Squirrels often feed on pine trees in summer, finding plenty of food by devouring the young cones. They make a great dirt under the trees throwing down the main stem of the cone, together with the gnawed seed vessels. This is the greatest animal for chattering, almost equal to the

monkey. It has a curious sound, which would be almost impossible to imitate or describe.

The flying species has no wings as might be expected, but the feet are connected with a membranous skin by means of which they fly or leap from one tree to another—appearing to fly, being capable of descending, but not of ascending. In coming downwards the air supports it, but the animal has no power to ascend, except by climbing the trunks of trees. They are a rich brown above and light below, and inhabit hollow trees.

CHIPMUNK OR GROUND SQUIRREL.

This well known little denizen of the rail fence is very common in summer, and is a beautiful creature, of a reddish brown color above, and light below. On the back are six black and white stripes, which constitutes one of its chief characteristics. It also has the chattering habit. The tail is as long as the other squirrels, but not near so bushy. These animals are noted for running the fence rails, going very fast either on worm or post fences, first in one direction and then in another. These animals live in holes in the ground and sometimes come out and play around the entrance, and when dangers approach they hastily return. Quite a familiar sight is to see these little creatures in autumn running homeward with their cheek pouches bearing their load of supplies for the winter. Sometimes this squirrel is called the ground hackey.

SKUNK.

This animal is one which few care to study or observe being very disagreeable to the olfactory nerves. The color is black and white, and the fur much prized and sought, especially in winter. The nose is long and pointed. Their food consists of small birds, eggs and chickens, which they steal from the poultry yard, often destroying many fowls. They may be caught in steel-traps, snares or dead-falls carefully set. These animals live in large burrows in the ground. There is only one thing named after this animal, which is skunk cabbage.

THE FOX.

We now have a very shy and cunning animal to deal with. He is about the size of a dog, of a reddish brown color, and a long bushy tail; the head has many of the features of the wolf. The fox is a good runner, and delights to baffle dogs which follow him, by jumping a long distance, thus making a break in the trail of scent. He lives in holes in the ground, and sometimes there are three or four together, forming a fortress or station. I have seen as many as four holes near together. In the center was a large stump used by them as a watch tower, and it was worn smooth by the constant tramping of their feet. A fence near by had been used as a lookout post and was worn in the same way. There were paths around the four entrances.

Fox-hunting is a past-time resorted to by some persons. Occasionally a number of men upon horses, both being gaily dressed, with a number of hounds, which

they depend upon for direction, start out disregarding property, as a general rule, leaping over fences and galloping over fields of grain or grass. The fox is a great depredator in the chicken house, killing many in a single night. They also eat ducks and geese. This animal has a bark something like that of a dog, which it utters as a signal of danger, or when surprised. Their young are called cubs, and also those of the wolf, bear, lion and jackal. There are several species of the fox: the common red fox, the gray fox, the arctic fox which is white, and others.

GROUND HOG OR WOODCHUCK.

This animal is well known to farmers, who use every means in their power to destroy it. Their color is brownish gray, feet short and well suited for digging. It is near the size of a large cat, though some broader. They live in burrows in the ground, which are long and winding, and have large heaps of dirt at the mouth. These holes are found in fence corners, or near large stumps, or in high banks, and sometimes in the center of large fields. They may often be seen sitting upon their haunches, looking and listening, and creeping along the ground eating their food. They take due care however, that they do not give anyone a chance to get between them and their home. If one is lucky enough to do this, and has dogs, he may be sure of him. When in close quarters, they are very apt to bite and scratch. Their food consists of hay and grass which they eat close to the ground. In winter this animal hibernates, and is said to appear one day in the winter season, the 2d of February, and that if it sees

its shadow it will not come out again for six weeks. Ground Hogs may be caught in traps, but care is necessary in handling them to prevent their biting. This animal is found almost all over the United States and Canada. Their habitations have several entrances and are so built that water cannot enter them. They are cleanly in their habits, and make nice pets when tamed, but are inclined to dig their way out of confinement, as the rabbit.

WEASEL.

(*Mustela Vulgaris.*)

This is a very small animal and is useful to the farmer in clearing away the rats and mice, which it tracks with deadly accuracy. The body is long and very slender; the teeth sharp and capable of inflicting a serious wound. They always creep upon their prey with the stealth of a cat, and when near enough spring at their throat and give them a severe bite. They eat the brain and suck the blood of the victim, but never devour the flesh unless forced by hunger. Their color is reddish brown above and light below, with a long bushy tail. They live in old dilapidated buildings or in stone heaps or other convenient hiding places. They mostly hunt during the night.

MUSK RAT.

This animal is very common along the banks of streams, where it makes long and curved holes leading to the water and connected by several entrances coming together at a center. They feed upon the roots of grasses, weeds, and trees. The ground near where they

live is generally marked with paths or roads leading to the feeding grounds which are always close at hand. These paths are more noticeable in winter than at other times. The musk rat receives its name from the strong odor which characterize them. These animals are much hunted and trapped. The hunter stands concealed back of a tree or bush waiting his appearance. Its tail is long and scaly, like the common rat; color, brownish gray.

MOUSE.

There are several species of mice: the common gray mouse, the field mouse, the harvest mouse and the white mouse. The latter one is much prized as a pet, being a handsome little creature. The mouse family is characterized by long tails, small ears and eyes, and body covered with fur. Rats are very much the same in general appearance, excepting in size, they being much larger than the mouse. The common mouse that lives about our houses needs no particular description. The field mouse is a little larger, and somewhat resembles the mole. They make nests in the grass or in rubbish heaps, which are composed of grass, bark, pieces of paper and other soft materials, all of which are chewed up and made into a fine soft nest. These mice are more frequently seen in autumn when corn shocks are being removed, or hay stacks displaced. They can run very fast. One handling them needs to have thick gloves on, as they are apt to bite. The harvest mouse is the smallest of quadrupeds, and was discovered by White, and so mentioned in his "Selborne." They live in grass fields and make curious little nests about the size

of a cricket ball. Its entrance is on the side. It is placed two or three feet from the ground, and is fastened to some straws or hay stems. The jumping mouse or jerboa is larger and has long hind legs and tail.

MOLE.

Although this animal is very common, it is not often seen, as its home is in the dark damp earth. Its body is covered with fine silky fur, which is exceedingly soft and does not become soiled or rumped by its constant contact with the soil. The eyes are very small, of a black color, and not easily seen; color of the fur bluish gray. The feet are broad and well adapted to the purpose for which the mole uses them. It digs long channels through the earth, and where these are the surface is raised up in mound form. It forms one large cell or room which constitutes its home, and from this in all directions run these galleries or passages, so that if one should be cut off it has a number of other chances to escape. Its principal food is the earth worm which it pursues and devours. Sometimes in the morning a hole may be discovered near a mole hill, in which case the animal has most likely been out the previous night in search for food. This is most apt to happen during damp nights, for the worms then come to the surface. The mole often causes quite an amount of trouble in newly made gardens, as they burrow under the planted seed, and uproot and destroy. They also spoil the appearance of a lawn by raising up the earth in various directions. Moles are supposed by some persons to be blind, also that they undergo great torment and suffering while living in the dark earth, all of

which are entirely incorrect, as the animal is happy in the lot assigned to it, and would not be if removed therefrom.

STAR-NOSED MOLE.

(*Astromyctes Cristatus.*)

This species is about the same size and color as the other, the chief difference being in the shape of the nose. That of the former is rather pointed and covered with hair or bristles. The nose of this species is the shape of a star, or radiating at the point. These animals are found in low wet places, as the banks of creeks.

THE BAT.

We now have before us another specimen of nature's curious works—a flying animal, for such is the bat. In general appearance they somewhat resemble a mouse. They are a grayish brown color. The fore feet are connected with a thin membranous skin, by means of which it bears itself wherever it pleases. Its hind feet are furnished with hooks, by which it attaches itself to objects and hangs downward most of the day. When evening is beginning to fall it wings its way through the air in a number of evolutions. A cruel experiment was once tried upon a bat to test its sight. One was caught, its eyes put out and then let lose in a large room across which a number of strings were stretched. It flew from one side to the other, back and forth several times, though it never flew against the strings, proving that they fly by touch almost as much as by sight.

There are several species of bats, some of which are very large. One species is known by the name of flying fox from the resemblance it bears to this animal; color reddish brown.

The vampire bat is the largest species, and is an inhabitant of South America. It is known to live principally upon the blood of animals, which it gets in the same manner as the mosquito. Taking its victim by night it selects some choice part, all the while fanning the prey with its wings, it bites a small hole through which it obtains its meal. They sometimes attack men in this way, which is very annoying.

Although the number of animals seen in a ramble over hills and dales are somewhat limited, yet there are hundreds of kinds distributed over America alone, with the Eastern Hemisphere and Australia included, many of which are curious and wonderful, especially those of the great island, where some rare specimens exist; but as this little volume is intended to describe home objects exclusively, all these will be omitted in it.

Besides the few animals already described, there are many other objects of interest to be noticed without much searching for. Some reptiles are noticeable, such as the turtle, snake, lizard, salamander and others. The turtles are well known, two species of which are more frequently seen than others—the wood or box turtle and the snapping turtle. All of these reptiles have a hard long covering which is ornamented in pretty colors and markings. This shell or house serves for a complete protection to them, they being able to draw their head and feet within it. The snapping turtle is a large species weighing many pounds; the shell is

rough and leathery, as is the case with water turtles. The tail is very rough and jagged, the jaws are strong and dangerous to tamper with. When they once get a hold of ones finger they seldom loosen the grasp till beheaded. If a stick be placed near their mouth or pointed at them, they will spring at it in great rage. When they spring at their foe they raise themselves upon their feet and throw the body forward. The water species are always very large and heavy, some requiring two or three men to turn them over. Some of the water turtles furnish good eating, and their capture is exciting to those interested. The time chosen to hunt them is at night when they come on shore to deposit eggs.

The snakes most frequently seen in this locality are the garter snake, black snake and copper-head. The first two named are harmless, while the last one is poisonous. All snakes, whether harmless or not are resentful to the feelings, and on seeing one most people are instantly seized with a desire to destroy it. Snakes are long limber creatures without feet. Their motion is produced by the action of the many bones which constitute vertebral column. Snakes have the power of charming birds, and when in this state they are helpless. The young of birds and the eggs fall a prey to the black snake quite frequently. Some of our birds are so courageous as to drive off and often to kill their enemy. Especially is this the case with the blue jay and mocking bird of the south. The rattlesnake is a terror and lives in the west.

Lizards much resemble snakes in appearance, having long slender bodies, but they also have feet with which they run and creep. These reptiles are mostly found in or near the water, and are as a general thing very small, but some species are larger than others, particularly those in the tropics. One large species here feeds upon the scorpion, and uses great skill to avoid being stung by it.

The Salamander is a species of this family, which is small, of a dark brown or black color, and has a very long and slender tail. It is often seen when removing stone heaps, or when digging around the roots of trees and stumps in the woods where the soil is rich. They are very fast, and manage to hide themselves easily when pursued. A peculiar circumstance connected with this family of creatures is that if a limb or part of the tail is destroyed new ones are said to come in their places without inconvenience to them.

Another set of creatures called Newts much resemble the lizard, but are larger and not so common. When walking by the creek side, you seldom fail to see quite a number of frogs, both small and great, which are mostly a greenish brown color above and white below, variously spotted and marked on the limbs and head; eyes golden color and very lustrous; feet are webbed and toes long, being well suited for swimming and aquatic life. They make a croaking noise which varies according to their size, and is uttered more frequently in the morning and evening.

The species known as the Heron frogs utter a loud shrill note, which is not unpleasant to the ear, but nearly deafening to one who is near the pond where

they are. This song or note is always heard in early spring, and is one of the first notes which greet the ear and tell us this joyous season is approaching. When looking for them the searcher is badly deceived, for when he thinks he has the sound located and proceeds to look for them, it comes from another quarter. They either move suddenly or become silent when the locality is neared. All frogs delight to sit or bask in the sun, and when disturbed utter a short croak and leap into the water. Some grow very large and the noise of a number of them is very disagreeable. The changes passed through in the life of a frog are very wonderful and bear some relation to insects in this particular. When the eggs hatch the young appear in the form of the well known tad-poles, which are seen in great numbers in our ponds. These when first hatched have a long tail and small chunky body without feet; when older and larger one pair of limbs come to view, and after a period of time is passed in this state a second pair appear, thus making a frog with a long tail; after a time this entirely disappears and the mature and perfect frog is formed. Who would have thought to look at a tad-pole, that at a future time it would be a frog. If all tad-poles thrive and go through these changes unharmed, a great number of frogs is likely to follow. They are generally numerous in stagnant pools. When walking along by creeks you sometimes notice dark brown shells of considerable size. These are the fresh water mussel. The living ones are often found lying upon the sand or shore, and when approached they close the shell tightly. When opened the contents does not present the appearance of a living creature,

but rather a soft white mass. After heavy rains or big freshets these shells may be found in great numbers, both large and small. Some are joined together and look quite pretty, but most of them are single and partly broken. The outside is brown and somewhat rough; the inside is very smooth and presents a beautiful pearl appearance.

In connection with the mussel is the clan, which species is larger, and the shell roundish, of the bivalve order. These are white and very thick and hard, and are caught in oyster localities, and are often found among oysters in the markets. By close observation of the stream a number of small black shells may be seen, of various shapes, though mostly of a conical or spiral form. Their structure is very frail, and they are easily broken. These are the houses of the water snail which is very common. The ground is often strewn with these shells and the mussels; those described and others of the same form and character form the division known as mollusks or soft shelled animals.

Oysters are caught in large numbers in the Delaware Bay and vicinity. Their life and habits are interesting and curious. The lowest forms of animal life are interesting and wonderful.

The crab also attracts our attention. It lives in small ponds and streams, and is a curious little creature with six legs and two arms or jaws which are used in offence and defence. They capture their prey, and hold and devour it by means of these instruments, and the person offering to touch them is very liable to receive a smart pinch. Fresh water crabs are small, but the hermit crab and others are larger. This species live in

shells. When those they inhabit become too small they go in search of others, and in this way continue until full grown, when the same shell will answer till worn out. Crabs are great travelers and pass over many miles of ground. They mostly migrate in the night.

The fish of our creeks and ponds are limited, but in the rivers, oceans and seas they are many and varied. The sun fish and minnow are very common; the spotted trout, bass and pike are also met with. When hook and line are cast in a creek, unless a very large one, the sun fish and minnow are chiefly caught. Larger ones and more varieties are caught in larger bodies of water. When fishing the eel is sometimes brought out in place of fish. These are long snake like creatures with a very slippery skin. They are used as food, and are much sought. The best time to secure them is after a heavy rain when the water is muddy and clouded. Fall grown ones are pretty large. The most unattractive places in nature's realm is full of life.

THE WORLD OVER.

From the mountains wild and rugged,
From the oceans crested wave,
From the woodlands and the valleys,
Come sweet voices of the bird;
And their rapturous notes of joy are heard,
The world over.

In the torrid's burning heat,
In the frigid's frozen clime,
In the lands beyond the sea,
We behold the butterfly and bee,
And their fairy flight, is seen,
The world over.

The earth in the richest of verdure,
 By the beautiful flowers is clad,
 The desolate landscapes and highways,
 By their fragrant blossoms made glad;
 And everywhere we turn in great abundance,
 The world over.

In the tree-tops branches,
 On the mountains crest,
 In the shadow of the lowlands,
 Upon the deserts breast,
 We find the various animals,
 In wild enjoyment revelling;
 And everywhere their forms we see,
 The world over.

When rambling by creek or streamlet,
 The fish in their home we see,
 And the reptile his life is pursuing,
 Feeling both happy and free,
 While every pool and rivulet,
 With invisible life is teeming,
 The world over.

Thus we see by observation,
 Of the many things around us,
 In the living and the lifeless,
 Upon the land or in the water;
 Theres universal wealth and action,
 The world over.

Over and over again,
 No matter which way we turn,
 We always find in natures book,
 Some lesson we can learn.
 The world over.

No matter what our position is,
 No matter where our lot be cast,
 A communion with these creatures,
 Brings a feeling of repast.

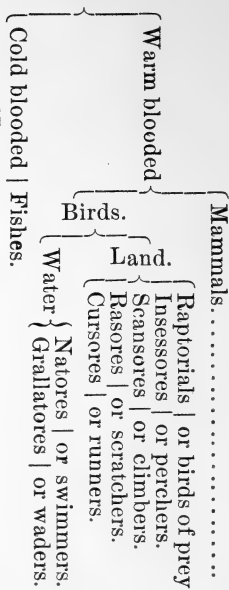
DIVISIONS OF THE ANIMAL KINGDOM.

For the following division and analysis of the whole animal kingdom, the writer is indebted to one of our great natural scientists, Dr. Worthington Hooker. The hundreds of animals which are distributed over the earth have been divided into families according to their food, habits, mode of living and other noticeable characteristics. These are called by various names under the existing circumstances, such as divisions, sub-divisions, classes, orders, families and genera; also species. Variety is used to designate different animals of the same species. By a careful study of the analysis of the kingdom persons are enabled to designate the kinds of animals which a piece of bone or tooth belongs to when shown to them. It also facilitates the study of them greatly, and it was for this end that the above named author and other naturalists prepared this chart. Each of these divisions have their peculiar characteristics. The Vertebrates are known by having a back-bone and spinal column. The articulates are known by being composed of rings or sections, such as insects. The mollusks are known as soft shelled or soft bodied animals. There are two kinds, one with heads, the other without; some are terrestrial and others are sea animals. The radiates or fourth division are the lowest of the kingdom, and some of them seem to be almost without life, the Polyps for example. Many of these animals bear a resemblance to plants.

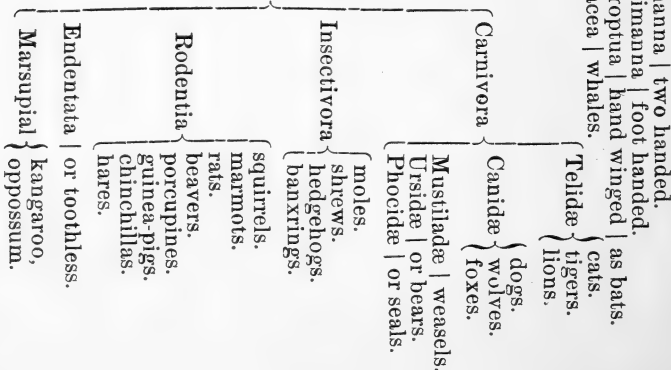
DIVISIONS OF THE ANIMAL KINGDOM ACCORDING TO DR. WORTHINGTON HOOKER.

134

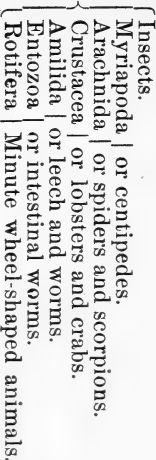
1. Vertebrates.



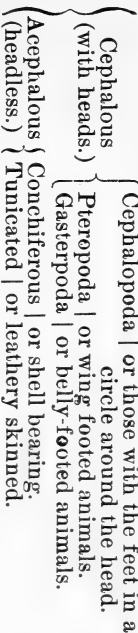
Quadrupeds.



2. Articulates.



3. Mollusks.



4. Radiates.



OBSERVATIONS.

In observing nature you are likely to see some very curious maneuvers, illustrating both instinct and wit. A few of these, made by myself would perhaps prove interesting to the readers of this work. Once while rambling through the woods, I came across a cat-bird's nest containing four young ones. Drawing near I watched them. Presently the mother-bird came with a mouthful of food, seeing me startled her at first but she soon became reconciled, and gave the morsel to one of the birds, next time a cherry was brought and put into the mouth of another, but the little thing could not swallow it. The mother seemed at once to understand what was wrong, and proceeded to remove the seed. The operation was again tried with better success. I remained for some time watching them, and was quite amused on seeing the above circumstance.

Another occasion my attention was attracted by a pair of house chippies or hair birds which were engaged in eating two crumbs of bread, one crumb was considerably larger than the other. The bird that had the smaller crumb of coarse finished first, when to my surprise the one having the larger piece broke it in half and proceeded to carry a piece to the other bird, thus sharing them equally. This was indeed amusing and illustrated sympathy and wit. We might well learn a lesson from these two chippies who divided their crumbs. Little idea can be obtained by writing of what is to be seen among the surrounding creatures. Most birds and animals exert great care for the protection and welfare of their young.

At another time while engaged in white-washing some pales, on a clear day, a wasp alighted on the fence near by and to my surprise began to scratch or chew little particles of wood from the fence with its jaws. When a little bundle of this was collected, it proceeded to roll it into a ball then carried it away between its feet. Very soon it returned and gathered another ball of fibers, and in this way continued for some time, coming and going with great perseverance. It was of course building a nest in the vicinity and using the little balls of woody fiber in its construction.

On another occasion I saw two young robins being fed by their mother. One of the babies seemed to understand better than the other and succeeded in obtaining a number of things for itself. But the most interesting part was, it also gave some to its little companion in the same manner that the old bird does, thus satisfying its own wants and also helping to feed its nestmate. So we see how the young watch and imitate their parents. At the same time that the above happened, a chipmunk (ground squirrel) came down the trunk of the tree, on seeing it the robin gave chase. It was very amusing to see them tearing around the tree's stem in a rapid manner. The bird was doubtless very angry, while the squirrel was in the height of its glory, and was exultant in having the best advantage, because he could travel around the trunk while the bird had to flutter in the air. Birds and squirrels sometimes have severe contests, but the latter are sure to take it as a matter of fun.

While sitting in the shade of an apple tree, preparing some wild grass for coloring, I heard the sound of

a humming-bird, and looking up saw one approaching me. On it came until it reached the distance of about one yard from me, and there poised itself for several seconds looking straight at me. I do not know whether it was as much gratified by the circumstance as I was or not; nor do I know for what it came.

A few days previous I noticed one flitting around one of our flower-beds. Presently it alighted on a neighboring clothes-line and sat for several minutes intently gazing around. Now turning its wee head this way, then that. Occasionally it would plume a feather or two. What an excellent opportunity to observe it, indeed it was not allowed to pass unimproved. Much to my discontent the little visitor soon took to its wings and was lost to sight.

When viewed under a microscope small objects are seen to a better advantage. I once examined a five spotted sphinx in this way and was well pleased by the result. The hair on its body resembled a cat's fur, and the antennæ looked similar to scrubbing brushes.

Many more of these observations could be given but as space is limited I will dwell a little upon the return of the birds in the spring, having for the past year or so taken notes when I saw them for the first time.

Third month 11th, 1887. Observed a large number of robins in a wooded district. They flew near together and appeared in every way as though they had just arrived from the south. This I find nearly corresponds with the time for their return given in histories and other books.

Third month 20th, 1887. To-day I noticed a very large flock of blue birds on a hill. They were eating

seeds which they found in the weeds of last year, and were warbling sweetly. I also saw some crows in the trees and heard some red-wings but did not see them. A few days previous I saw a solitary gold-finch which was pouring out its clear sweet notes from the leafless branches of a tall tree. I was thus convinced that my pets were returning.

Third month 25th, 1887. Found a large bunch of Jonquils.

Fourth month 7th, 1887. I was rejoiced to see three turtledoves which were just from the south, and thought how soon we would hear their cooing in the dark pines and elsewhere around us.

Fourth month 9th, 1887 To-day I heard the sweet voice of the wood thrush, and also saw a chipping sparrow. On rambling by a creek-side I noticed a water thrush or wag-tail, and soon after a large snake, the sight of which was not at all desirable. The herring frogs were croaking so loudly as to almost deafen you, while ants made their appearance near a large stone.

From Fourth month 14th, to Fifth month 1st, 1887 Between these dates, I observed the following newcomers: house-wren, cedar bird, cat bird, king bird, orchard oriole, Baltimore oriole, wood thrush and a species of vireo. In addition to the birds, I noticed a hop-toad, a bat, some humble bees and butterflies. The next day, or Fifth month 2d, I saw two green herons.

Fifth month, 1887, while rambling in the woods I saw two beautiful summer visitors, the scarlet tanager and indigo bunting, which are among the last to arrive at the opening of the season. On the 22d of Fifth

month I noticed two small birds which I think were killdeers. They somewhat resembled snipes. Their legs were long, necks long and slender, eyes and head small, bill long and well adapted to plowing in the mud, which they were doing when I saw them. They walked slightly sideways, and had a faint peeping note, color grayish brown mixed.

- I find this very interesting employment to notice the coming of the different species of birds and other creatures. It is useful as a reference when they are gone. The various times of nesting are also interesting. Some quite early construct their summer homes; others are later in doing it. At the same time that many of our birds are leaving for the winter others are coming to us from summer haunts.



PART V.

NATURAL PHENOMENA AND CHANGES.

Natural phenomena and changes are very numerous and interesting, and as this book is based upon all such things as pertain to nature, they will doubtless prove of interest in connection with the preceding subjects which have been briefly treated. One of these agencies is earthquakes, which are very destructive to property and life. Some countries are visited quite frequently by them. Occasionally whole cities are buried and hundreds of people perish in the chasms. Such as these have occurred in South America and Europe, the earthquake at Lisbon having been one of the most destructive on record. These phenomena usually consist of shocks or vibrations which are heavy or light according to the distance from the center of the disturbance. It causes a tremor or shaking over large districts, and shakes houses even when no further danger follows. The people of the United States had considerable experience with this visitation at the time of the shocks occurring in South Carolina and vicinity, that being nearer than any previous ones. They extend under water as well as through the land and create great swelling of the waves. This is one cause of the changes in and around large bodies of water.

Animals especially appear to have a correct knowledge of the trouble when they feel the earth trembling beneath them manifesting great fear and anxiety, often placing their head close to the ground and listening for the well known sound within, and thus

become aware of impending danger before man knows that danger is at hand; though both will suffer the same fate unless they escape from the vicinity. There is often a rumbling noise accompanying the waves of motion, which travel in an undulating manner, and large chasms are opened in the locality of the severest disturbance. Volcanic regions are more liable to earthquakes than others, owing to the infuriated condition of the earth's interior at such places, and when eruptions take place they produce a great strain on the surrounding country. The supposed cause of these disturbances is mainly the heated condition of the earth's interior, and the great strain and hard swelling produced on the crust or surface, when the mass is cooling. Thus the contraction and expansion which takes place afterwards is held as the chief cause. There are also other things which are considered as secondary means in producing them. South America, some parts of Europe, and other volcanic regions are the main localities.

In connection with this subject volcanoes should be mentioned, as the two are to a certain extent linked together. In general appearance they resemble common mountains, which they are, differing only by the volcano having an open channel from the inside of the earth to the outside, through which what is known as lava is thrown or forced out. Volcanoes differ greatly in size; also in the amount of matter thrown out. They are divided into two classes, active and neutral. The former are those which have a continual succession of eruptions; the latter are those which seldom if ever show signs of internal disturbance. Volcanoes which

never have eruptions, but which were active at one time are called extinct volcanoes. The interior of these great mountains of fire, or the mouth is called a crater, which in some places is immensely large. The crater of Mt. Vesuvius is one of the largest in existence. There is great danger in approaching these, especially after an eruption. The material which has been thrown out, though appearing to be cold, is so intensely hot as to burn the shoes of a person walking upon it. The substances usually thrown from these volcanoes are lava, (melted rock), fire, smoke and sometimes large stones, which are thrown violently to a great height. Showers of ashes are also frequent, being thrown up to settle down on surrounding objects. Lava is the chief substance discharged, and the quantity is sometimes so great as to entirely bury villages and towns, the inhabitants perishing unless succeeding in escaping to some elevated position where the fire and smoking lava cannot reach them. Cities which have been thus buried in former times are afterwards dug into, or in other ways discovered, and the houses and contents are sometimes found in the exact state in which the terrified owners left them. Many and curious relics have been found in these underground cities. The great destruction which came upon Pompeii from volcanic eruption is familiar to many, it being one of the many flourishing towns which have met the same fate, and in which so many people lost their lives. A vivid picturing of the city and the terrible inundation of lava may be viewed at Fairmount Park, Philadelphia.

A rumbling sound, as of thunder, often is heard before a breaking out, and a tremendous motion of the earth near the place, plainly showing what a contest is raging inside, and what powerful exertions are being made by the imprisoned substance to effect an escape, and when the crust can no longer resist the pressure it gives way and the whole mass is thrown violently upward. Sometimes it shoots up nearly perpendicular, in which case it very often falls directly back into the crater. Volcanoes are widely distributed over all parts of the earth, and are numerous, although all are not active. They are more abundant along sea coasts and large mountain chains. Lava is mostly of a grayish brown color when cool, and is sometimes made into very pretty articles. We learn by earthquakes and volcanoes the condition of the interior of our earth—a sea of fire and turmoil, a wonderful thing indeed to realize. Think of a globe the inside of which is on fire and the outside upon which we live being the hardened or cool crust. The earth is supposed to have been one huge heated mass at one time, and when cooling the large rocks and interesting formations now found were formed. One proof of this existing heat is that certain kinds of rocks which are formed in the presence of great heat are found to underlie all others, or are found deeper in the earth.

A regular study of these interesting and wonderful facts which are known and being made known would be very profitable, especially to those who are lovers of geology, minerals and the many formations of past and present ages. The formation of mountains is supposed to have been caused by the heated interior, and when the earth was just forming the great upheaving of the crust caused the mountains, which have remained in an uplifted position. Some mountain chains are grand beyond description. The exhilarating freshness of the air, the beautiful scenery which they present, and the lovely temperature, all do their part towards making the mountains attractive to the tourist, the hunter, the naturalist, and the pleasure seeker. Among them are often pleasant resorts for the wanderer. Mountains are a great source of mineral wealth, and the heads of numerous rivers and rills.

The eclipse of the sun and moon is another curious feature coming under this head, it being caused by the earth reaching such a position as to throw a shadow upon them, one or both, this being an evidence of the rotundity of the earth, as the shadows it casts are round. The eclipse may be whole or partial. In the former the sun or moon may be viewed to good advantage; but in case of total eclipse of the sun, if it occur in the day time, it becomes as twilight and so remains until it is over. A full eclipse causes some excitement among the people, who are anxious to obtain a good view, especially astronomers and professors, some of which go long distances to witness them.

Another beautiful phenomena is the bow of promise which we witness after rain showers. Every one is

familiar with the rain-bow, and are glad to see it. The cause of it is plain, being formed by the sunlight passing through the drops of water and separating them into their prismatic colors, seven in number, as follows: violet, indigo, blue, green, yellow, orange and red arranged in order. Often another but fainter bow is seen beside the other which is called the secondary bow. The colors in this bow being scarcely discernable, the violet showing the plainest. What is prettier than the rainbow after a storm, and ere the black clouds have departed to see this gaily colored arch over us, always bringing to mind the story told in scripture in reference to it. Many and amusing are the tales told of children and other persons searching for gold at the end of the bow, many and sad were the disappointments and experiences of these misled hunters of fortune.

The *Aurora Borealis* or northern light is another beautiful display exhibited by nature in the polar regions. It occurs in various forms, sometimes huge pillars of fire seem to move across the heavens. At other times the whole sky appears to be illuminated by a vast scarlet snow falling and drifting about. The most common figure is an arch of fire, with numerous streamers proceeding from it and moving toward the zenith. Auroras occur usually in the high latitudes though not in the immediate vicinity of the poles. These gorgeous displays are caused by the passage of electricity through the upper regions. The proof taken is as follows: During the appearance of an Aurora telegraph wires manifest an unusual degree of disturbance; also the magnetic needle is subject to

frequent oscillations. The same phenomena can be produced by the passage of an electric current through rarefied gases, the different colors shown arising from the passage of electricity through the various gases. An excellent illustration of this is shown in the geissler tubes.

The milk-maid's path is also observable, generally reaching across the sky in an arched manner, but has no definite edges, gradually blending out of sight in the blue of the surrounding sky. It is white and not very broad, and may often be seen on clear evenings, but is not so attractive as the preceding subjects.

St. Elmo's Fire is among the remainder of these sights and objects. When the atmosphere is highly charaed with electricity, faint tongues of fire are often seen on objects in connection with the earth, such as the masts of ships, spires and steeples. They are harmless, and are mostly observed in times of thunder showers and storms.

The Mirage is another curious occurance which is sometimes seen in deserts over the hot aired sand when the strata of air rapidly increases from the surface upwards. The rays of light from distant objects are reflected from one of the lower layers of air, and, entering the eye of the observer, appears to come from inverted objects, looking as if they were surrounded by a sheet of water. The mirage frequently occur at sea, and vessels which are too far below the horizon to be discernable are seen inverted by refraction. This phenomena is called loaming. The vessels are seen both erect and inverted, and sometimes appear as if suspended in the clouds, and distant islands are occasionally

visible from the same cause. Weary travelers upon the desert are in some cases sadly disappointed at not finding the beautiful islands, refreshing streams, and trees which he saw in the above named manner. The only place which cheers the desert company is the oasis—a small spot or tract of ground which is always fertile.

Halos and Coronel are rings of prismatic colors surrounding the sun and moon. They are caused by the presence in the air of small crystals of ice or snow. Parhelia or mock suns and Paraselenæ or mock moons are seen when the complicated circles intersect each other. Here bright spots are seen which somewhat resemble the sun and moon. Coronae are similar circles seen around the moon, and are caused by small quantities of condensed vapor in the air. They generally indicate changes in the weather. Many and varied are the natural displays which are witnessed over all parts of the world, and when describing one it brings to view vividly a large number of them.

Another of importance, though not seen in bright colors or figures is the effect produced by the attraction of the sun and moon upon bodies of water, causing high and low tides. If the earth did not revolve the tidal waves would in reality follow the moon in its revolution around the earth. When the sun and moon act together on the same hemisphere the wave is higher than usual and is then called spring tides. These two bodies or planets have great influence over the water, and are the main agencies of its changes.

While treating upon the beautiful objects seen in the world, the gorgeous hues and tints of the sunset

and sunrise, also the lovely blue of the clear sky above must not be omitted. Who can help admiring them, as the crimson, golden and violet shades blend handsomely together and become ever deeper and more lustrous as the great sun approaches or departs, and the sky appears as if set with gems and rubies in rich profusion, and glitters as if covered with innumerable crystals. The cause of these tints is based upon the dispersion of the sun's rays in passing through the clouds and vapor, causing those colors to show which are least turned out of their course. The azure blue of our sky is supposed to be caused by the reflection of light from numerous small opaque particles which are in the air, all of these having a tendency to produce a bluish cast. To look at the sky when clear a person would naturally think that scarcely anything could be purer, but this beautiful appearance is formed by the refraction of light from minute dust particles which fill the atmosphere; also other substances. The atmosphere is wonderful; it is a vast ocean of air which would be the same depth everywhere, except for the earth's rotation and the heat of the sun. Owing to these causes the upper regions are thrown in huge masses in some places, while it is deeply hollowed out in others, thus making a constant circulation and interchange between the poles. By retaining and modifying the solar heat, absorbing moisture and distributing it over the earth, and supplying animals and plants with the life-giving oxygen. The atmosphere fills a highly important station in the economy of the globe. Meteorology is the science which treats upon it in all its forms and changes. The elasticity of the atmos-

phere is great, always springing back to its former bulk when confined and liberated. It likewise expands or contracts on being heated or cooled. The pressure of this substance is enormous, but so evenly is it exerted upon things that the great weight is scarcely noticeable. The amount of pressure is about fifteen pounds to every square inch of surface. The atmosphere extends upwards many miles, but the greatest bulk of it lies below the summits of high mountains. The higher we ascend the more rare it becomes, and this causes the difficulty in breathing experienced by those who ascend to great heights for observation or amusement.

Climate is the amount of heat or cold, moisture or dryness which the atmosphere contains. Some climates are uniform, as in the torrid zones, and others vary as in the temperate regions. The country in some places is much healthier than in others, owing to various causes.

The formation of rain, dew, hail and snow are interesting and come in connection with the atmosphere. From all bodies of water the sun is constantly drawing moisture which may be seen in the appearance of rays or columns reaching from the water to the sun somewhat resembling the dust in a room when the light is shining through it. When the air has received by this process all the moisture it is capable of holding it is said to be at its dew-point and the water then forms in clouds and descends in rain to refresh the earth and afterwards to be taken up again in the same manner.

Hail is frozen water formed into balls or chunks. The storms in summer are frequently accompanied by hail which causes great damage when severe. The

stones range in size from peas up to walnuts and in some cases have been known to reach the size of hen's eggs. The main theory of hail is considered the rotary motion of the wind as in a cyclone, excepting it is horizontal instead of vertical. Two layers of clouds usually exist, one of rain the other of snow. The snow-flakes are supposed to be caught in the whorl and rapidly dipped in succession into water and then snow, receiving alternate coatings of each, until at last they are hurled to the ground. There are other theories presented but the above is usually accepted as correct. When the temperature of the condensed moisture is below 32° F. snow falls providing the conditions permit a definite crystallization. The snow-flakes present many beautiful forms, but are all composed of minute rhombohedrons of ice. The star-shaped are the most common. If the temperature at the surface be much warmer than 32° any snow that is formed in the upper regions must melt before it reaches the ground, hence in the temperate zones the snow falls occur in winter only and in the tropics it never falls except near the summit of high mountains. At a certain height above the sea according to latitude and physical changes, the ground is permanently covered with snow.

Glaciers are large rivers of ice usually found in mountainous regions, which move very slowly and make their way down the ravines and chasms. Like rivers they have their tributaries. They are usually white but when mixed with sand and debris become quite dark. These glaciers are sometimes very smooth while others are rough and jagged. These glaciers are very powerful carrying everything with which they come in con-

tact to the lower level there depositing it in great piles called moraines. They are of two or three classes according to the locality and circumstances of the deposit. They are sometimes one hundred feet or over in height. Erosion of glaciers is their cutting tearing or rubbing against the sides of the valley through which they pass. In old and deserted ravines where they had previously been, these evidences of this cutting are plainly visible. The largest and best known glacier region is in Europe near the central Alps, where not less than eleven hundred occur many of which are quite large.

Ice bergs may be found in great abundance in the arctic regions, and navigation could be extended much farther north were it not for them. The adventures of explorers on their voyages toward the poles are both thrilling and interesting. Sometimes a number of ice bergs become detached and float loosely around. These are deadly foes of vessels.

The dew which refreshes the earth in summer is worthy of our notice and claims our attention and a share of our regard as well as other natural agencies which have already been described. Everyone has noticed that when water is poured into a glass on a hot day the outer surface becomes covered with moisture. Dew is caused in the same manner. In the evening when the plants and other objects become cool or cooler than the surrounding air, their contact with it brings its temperature below dew point, when the moisture in the air is condensed and settles upon the plants in little drops. Some collect more than others,

merely because they lose their warmth quicker. More dew falls on a clear night than a cloudy one, because objects cool quicker on the surface under a clear sky than a cloudy one, more dew falls during a still night than a windy one for the air must remain still long enough for the various objects to lower its temperature and collect its moisture, heavy winds prevent this while gentle breezes favor it by bringing new air in contact with the objects. In the tropics during seasons when the sky is clear, the dew is so copious as to resemble a gentle rain. In many hot countries there are no rainfalls. In such cases these dews are uncommonly large thus making a full provision for the absence of this needful article. Some mountainous regions, owing to the winds and other agencies are entirely without rain, in other localities the year has two seasons, the wet and the dry.

Along with rain and dew, the clouds should be classified. There are four primary forms of clouds as follows: Cirrus clouds or those consisting of a fleecy or feathery mass of condensed vapor, which is deposited in the higher regions of the air. Second, Cumulus or heap clouds, which are denser and are found in the lower portions of the atmosphere where the quantity of vapor is greater. They generally consist of rounded masses looking like snow-banks in beautiful purity and whiteness. They are caused by ascending currents of air which have their moisture condensed by elevation and occur during the hottest part of the day. Third, Stratus clouds or those formed in long horizontal sheets, they occur mostly in the evening and morning when the ascending currents are weak.

Fourth, the *Nimbus* or storm clouds are any from which rain falls. By some they are not regarded as a distinct form of cloud. These primary classes form various other shapes and figures which are called secondary clouds, but are only a combination of the former classes.

Natural changes are many and are taking place over all parts of the world. Rivers are doing a great deal in this line, as they widen and deepen the channels through which they flow, and in many cases make new ones. In this way the coasts of continents are often changed. The ocean takes a very active part in this work, as we notice islands disappearing in some places and appearing in others. Portions of the coasts are constantly changing some rising and others sinking thus proving the existence of universal action among the elements. Earthquakes and volcanoes also produce perceptive changes in the surrounding country. Coral insects also form new land where none before existed.

The general color of the ocean is deep blue while in some places it is a green or red cast, owing to the presence of minute organisms. Waters are divided into various classes, according to their composition and qualities. Calcareous waters or springs are those which contain lime. Solicious, or those containing silicon, come under the head of Geysers. Sulphurous waters or those containing metallic sulphides or sulphates; Chabylsate or those containing iron; and Ascidulous waters or those containing large quantities of carbonic acid, also brines like the oceans and seas.

Springs are likewise divided into various classes. There are hot springs or geysers which send large quan-

tities of boiling water to a great height, and act something like a volcano. They are found in Europe and America. It is necessary that visitors avoid going too close to them.

Mineral springs contain mineral substances, which are extensively used for medical purposes, and are often visited by invalids. Cold springs are those whose temperature does not arrive above 60° F. What a refreshing thing a cold spring of water is, whether in a spring house or in some wilderness among rocks and shrubbery. In the latter case it is more grand both as serving to refresh the wanderer, and add to the picturesqueness of the scene. How pleasant it is when one is weary of roaming about to sit down by a spring of water and feel its cooling influence, and listen to its gentle murmur! What pleasant stories it seems to tell of those who have come to quench their thirst from its never ceasing supply, and how they have lingered by its side in calm and peaceful enjoyment, forgetful of life's many troubles.

ROCKS AND MINERALS.

Rocks form an interesting feature in landscapes. There are many different kinds, varying in size, form and structure, according to the age in which they were made. Most of the rocks seen upon the surface are a bluish gray color, and very hard, while others are of a red or yellow cast, as in the various shades of sandstone or soft and crumbling rock. In some deep cuts and excavations along rail roads and carriage roads, soft stone may be seen which is formed in thin sheets or layers and is easily crumbled by the pressure of the

hand. Another substance of this kind is of a red or pink color, and appears as if it had been inlaid with specks of gold. Although not valuable it is a pretty stone. The crystalline rocks are those which were formed in the presence of great heat, and they are found to underlie all others. It should here be stated that all rocks should be divided into two classes, the stratified or those formed in layers. Aqueous rocks are always of this form. The second class, unstratified or those destitute of any regular arrangement. The metamorphic rocks are those which by the action of interior heat have lost their former stratification. The aqueous rocks are those deposited as sediment by water. Igneous rocks are those which are ejected in a melted form and afterwards cooled. These different kinds of rocks are interesting for study and observation. The origin of rocks is supposed to be as follows: while the earth was still in a melted condition the water which now covers the larger portion of its surface could find no resting place, but hung over it either as huge uncondensed clouds, or vapor. When a comparatively thin crust had formed this moisture was condensed and fell in rain, and completely covered the earth in a deep layer of boiling water. Occasionally the crust was broken in places and some of the molten material thrown up, upon which the water formed layers in regular form of sediment over the ocean's bed. When by long cooling the crust had become thicker and firmer, and formed into huge folds by the contracting strains, portions were forced above the water and formed dry land. During all this time the water had been arranging the looser materials into layers or strata, which lay

in a horizontal position, but when an outbreak occurred this regularity was destroyed. The origin and formation of rocks and other substances which were made in past ages has been the object of a great deal of study and investigation by scientific men.

When gazing upon a large rock in its present moss-covered form you can scarcely conceive the many changes it has gone through. Most likely at some period it has been deep down in the earth, and perhaps has been in a molten condition, tossed and thrown in many shapes by the furious movements of the interior. At last it has come to rest. Will it always stay in its present condition, or will it again undergo some change either by man or some natural agency? Rocks are disappearing, owing to the increasing cultivation and clearing of lands, but in many places they are quite abundant. They make very handsome scenery along creeks and lakes. One can form a beautiful picture in his mind composed of rocks, water, trees and grass, a picture worth looking at, and one which fills you with intense admiration. There is a fertile valley with huge boulders and on either side between which a little stream is winding its way, and perchance in some cozy nook a sparkling stream is found whose crystal waters are every day bathing the golden sands and round pebbles which form its bed. Near the stream the grass is growing in rich verdure, while here and there from among its tender blades peep the hardy faces of beautiful flowers, while on the summit of the banks and scattered along them the trees lift their spreading branches which wave in gentle swellings in the soft zephyrs, in which; the birds are rejoicing in merry

freedom, and perhaps you may see one of these perched upon a stone by the brook dipping his little bill into the refreshing waters, lifting his head at every sup. Yes, a picture like this is well worth looking upon. In it are no touches of the artist's brush or draughtsman's pencil, but all is the beauty of natural grandeur. These are no fancy imaginations or fairy tales for such scenes are to be found in all parts of the world.

In as much as fossils are usually found in and among rocks, it would be well to mention them here. First what are fossils? They are the remains of animals and plants which have been buried by natural causes. Usually the soft parts of the organisms have disappeared leaving only the harder portions. Sometimes the soft material is removed and gradually replaced by mineral matter which becomes hard. In this condition they are called petrifications, some of which are very curious. Sometimes the mere impression of a formerly existing animal or plant is all that remains. These have been found stamped on rocks under ground, as the feet of some beast, or delicate fern-like impressions of some plant. Many of these are imperfect and defaced while others are wholly entire and beautiful. In this way a faint idea may be obtained of the appearance of extinct vegetation and animal life. Some remains show that the animals in those times were of enormous size, far surpassing those of the present age. Such, for instance, was the mastodon, a large creature with two great tusks.

The divisions of the Geological time are interesting. The Azoic time, or that period when there was no life, the Paleozoic time or the period when the plants and

animals bore but little resemblance to those now living. Mesozoic time or the period known as middle life when the creatures began to be something like ours. The Cenozoic time or recent life, and the present time or that in which we live, are divided into Ages, such as Silurian or mollusks, Devonian or fishes, Carboniferous or the age of coal plants. From the pictures we see and the histories we read, those creatures of past ages must have been very curious and ferocious. The age of reptiles was the most extensive, and it was during that time that animals began to resemble those now in existence. The further in the earth the fossil is found the less resemblance it bears.

Petrifaction or hardening into stone is more likely to take place when the objects are buried near or under water. Wood bears exactly the same appearance that it did previous to the change. All the fibers and wrinkles upon the bark are vividly show. Such specimens are very desirable for cabinets. The mineral wealth and distribution of the world is beyond calculation, and the varieties many. Some are rare and beautiful, others abundant and useful.

The mineral wealth of the United States is enormous. Those found in most abundance are gold, silver, copper, iron, lead zinc and platinum, all of which are useful in some manner. Gold is found chiefly in California, in this section of country, although new and extensive deposits are found in other localities. It is used in the making of jewelry, ornaments and money. Silver is put to much the same use. The main copper regions are in the vicinity of lake Superior, where it is very abundant. Its uses are many and well known. Iron

is very abundant in Pennsylvania and other states. It would be almost impossible to get along without this highly important metal, for, as every one knows, it is used in hundreds of different ways, for bridges, buildings, wagons, nails, bolts, and for use on ships in plating or sheathing them, for making locomotives, and in the manufacture of many other machines and implements. In bridge building iron is used in plates or large pieces, and also in wires as in suspension bridges. Steel is much used for this purpose, and many long spans have been successfully made, thus avoiding one trouble, that of having the supports washed away by floods. Steel is one of the most ductile of these metals and can be drawn out into very fine wire. Gold also has the same property, and it can be hammered into sheets so thin that thousands of them can be placed in a pile and not be an inch thick.

All these substances, though being of a mineral nature are called metals. Iron when first taken from the ground is in a very rough state, and has to be melted and refined before it is ready for use. The others have to go through the same process, some more particularly owing to the purpose for which they are wanted. Brass is a combination of other metals, and is much used in bell making. Platenum, lead, zinc and other metals are used for different purposes. Zinc in contact with carbonic acid immediately dissolves with steaming and fizzing. Common sugar acts very similar and when set fire to, burns rapidly for a short time, emitting a bluish yellow flame and a large amount of smoke. When it becomes quiet there is nothing left but carbon. Try the experiment and witness the flame and smoke.

The mineral productions of the earth are very great. Miners often find precious stones, rubies, and diamonds the hardest known substance. Some of these jewels are exceedingly valuable because of their scarcity. They are of several colors. One of the common minerals is quartz crystals which are very pretty, and are sometimes found in stones. They exist in many forms, such as globular or like little balls, in four six and eight sided steeples or pointed pieces, which are sometimes cut as evenly as if done with a chisel. Others are found in a delicate net-work or stringy form, which is very pretty, particularly when it is white. Some of them are brownish while others are of a mixed color. There are many species or crystals some of which are very rare and beautiful, such is the Iceland Spar, which is very pure and well formed. Some minerals are white and others are colored. Many of the colored ones are very beautiful, as glass which is found blue filled with white spots and green with the same. Its formation is curious, the specks or little white balls are distributed all throughout it and presents a very striking appearance.

Asbestos is another common mineral. It in some cases looks like wood, showing the fibrous and barklike marks. It is light green in color and is quite soft having a smooth greasy appearance such as soapstone. Soapstone receives its name from its soapy appearance and has the property of marking like slate and is sometimes used for making pencils. The many different kinds of minerals are too numerous to go into separate details or explanations, for justice cannot be given them without filling a large volume.

Mineralogy is the science which treats upon minerals in all their forms, colors and localities. Some petrified vegetable substances resemble minerals when found. Moss when changed into stone is beautiful, showing as in its natural state. The building stone of the United States is found in large quantities, and in various forms and colors, such as marble, serpentine, granite, flint and others. Marble is very hard and beautiful, and is used for fine purposes, as monuments, mantels and decorating buildings. It is of several colors, white mingled with dark shades. Serpentine is a very handsome building stone, is a green color, and sometimes has dark or light streaks through it. Marble and serpentine when used together make a very attractive building. Granite is also much used and is very pretty; color grayish, similar to a mixture of pepper and salt.

THE SOLAR SYSTEM.

The Solar System comprises the sun, eight large bodies called planets, and as far as is known about one-hundred and seventy-five smaller bodies called asteroids, besides numerous comets and meteors. As these objects are equal in interest to those upon the earth, a brief sketch will be given. Stars are points or lights which dot the sky in clear evenings and at all times, but during the day we cannot see them on account of the great light of the sun. Stars are not points; that is not what was meant. They are immense balls of matter which look like points owing to their great distance from us. Most of them are heated so intensely that they give out light in all directions. There are

other similar stars or balls beyond the ones which we see, but they are not visible except through the telescope, and it is believed that there are still others beyond these. All of these bodies do not shine by their own light. Those nearest the earth shine by the light of the sun, and are called planets, and move with the earth around the sun. Some of these planets have moons or satellites moving around them. These are also included in the Solar System. Think of our earth resting upon nothing, and turning rapidly in rotation, which if it were not for friction and gravitation would hurl everything from its surface. It also has another motion called revolution. This is its traveling around the sun. The eight planets are named in order, according to their distance from the sun. Mercury is the nearest, then comes Venus, then the Earth, then Mars, Jupiter, Saturn, Uranus and Neptune. The first four are comparatively small while the last four are comparatively large, Jupiter being nearly fourteen-hundred times larger than the earth. Saturn has besides its moons a number of ring-like accumulations of matter revolving around it. The sun is the central body of the Solar System, and from it proceeds the light we see and the heat we feel. The heat of the sun is believed to be caused by the contraction of the burning mass which forms it. Comets are star-like bodies having a train of shining light called a tail. They revolve in or through an elliptical orbit, and are very beautiful. Meteors are bodies or stars which fall from their position. Many times when viewing the stars, you notice one of their number fall or shoot some distance and then disappear; and quite frequently stars leave a show-

er or streak of fire behind them, which lasts about a second. These meteors are sometimes followed to the ground, and some which have been found are very large.

Nature, like man, has her fire-works, but she takes no set time to exhibit them. Besides this kind of displays there are many figures and formations constructed by the stars which are beautiful and dignified. Those which show with great plainness are the large and small dipper. The former is also taken as part of the far famed northern bear or Ursa Major. Orion also is a noted figure. It is a representation of a man with belt and sword, and is very large. There are many other forms which are noticeable, but to view the heavenly bodies to the greatest advantage a telescope is necessary, as it reveals so many sights which to the naked eye are invisible. The moon appears through the telescope like a mass of mountains and valleys, but I believe no one has yet seen the man. The sun, moon and stars provide a field for a vast amount of study and observation, and those who notice them for the purpose of learning will find no small task before them, but one which will require as much time and thought as any of the other branches of science. What an extensive and beautiful array they present on clear bright nights, reminding one of an innumerable host with lighted torches, while the moon shines forth with grandure.

From the alluring earth of beauty,
 And the Oceans depth of wonders,
 My thoughts ascend into the skies,
 And dwell among the stars;
 There to watch the meteors' ariel flight,
 And the comet in its path of travel,
 And bask in the glorious moon-beams. —*B. Mercer.*

The wonders of the great deep are unlimited, and are of great interest to the naturalist. Shells are the main feature. These are washed up from great depths by the waves, and cast upon the beach, where eager searchers are always looking for their arrival. They exist in hundreds of shapes, sizes and colors, and are quite attractive for parlor or cabinet use. The most delicate shades and blending of colors are witnessed in them, besides the odd formation of many of them. Shells are the homes of sea animals of the mollusk order, excepting in the case of the hermit crab. Its shell, however, is really not its own, but was adopted by it for a temporary house.

There are numerous corals and other formations found in abundance. The ocean itself is grand. How solemnizing is the effect produced by gazing upon its vast billows and waves, and see the spray and foam of the wild angry breakers as they dash upon the shore! One would naturally think to watch the great swiftness with which they approach, and the vast numbers of them, that they would overwhelm the land far and near, but their bounds have been set, and are never to be broken or over-run. The general color of the sea is deep blue or dark green.

"By His knowledge the depths are broken up and the clouds drop down dew."—*Prov. III. 20.*

"For in six days the Lord made heaven and earth, the sea, and all that in them is."—*Exodus XX. 11.*

These beautiful passages were written in regard to the wonders of the clouds, sea and land, and are appropriate lines to supplement the above beauties, which have been faintly pictured.

DISCOVERIES AND INVENTIONS

The discoveries and inventions which nature has brought about are very interesting, and a few of them will be mentioned here. The invention of the pendulum was brought about in a novel way. The great and noble Galileo was one evening attracted by the swinging of the chandeliers in a church caused by the wind blowing upon them. He thought a pendulum could be invented so as to move back and forth in the same manner as the lamps. After considerable work and experimenting he succeeded in making one, such as regulate our clocks, so the story goes. He was one of the greatest philosophers of his time, and made many useful discoveries, which have greatly aided in the advancement of science.

The invention of the lyre originated as follows: it is said that a certain gentleman in taking one of his rambling excursions, chanced to find an old shell of a turtle which was lying bottom upwards, plainly showing the little cross bones or ribs, which were clean and dry from long exposure. Although the object before him was not a striking one, yet after examining it for some time the thought at last occurred to him that a musical instrument could be made on the same plan. He accordingly went to work and the lyre was the result of his labors.

The natural occurrence of the apple falling from the tree upon which it grew attracted the attention of Sir Isaac Newton who was one of the many great philosophical men. History says that he was one day sitting under an apple tree, when one of the apples above him fell to the ground. A very simple thing indeed, and

one which few would give a second thought, but it created in his ingenious mind a long train of thought and reasoning which he dwelt upon. He wondered what caused the apple to fall to the earth, and many other questions were put to himself in regard to it, and after much thought and experimenting he discovered the great and universal law of Gravitation, which before was unknown or only partly understood. Thus we see very small and apparently very simple happenings may lead to great and important ends. Frost for instance, does not make great pretensions or show, but it accomplishes much. Things regarding science and nature are not attained by a single bound, but are accomplished little at a time—step by step, until the desired end is gained.

Notice the majestic trees of the forest. Do they reach their glorious height and powerful strength in a few days? No, they, like other great things, begin in a small way. The oaks from tiny acorns spring, and are for a long time young and tender, and easily destroyed, but by continual growth and length of years they become great and towering trees, defying hurt except by the woodman's axe, or by the blasting hand of great storms. In how short a time, these trees can be leveled to the ground and stripped of their beauty and majesty, which have been so many long years in reaching their present station!

Who having read history does not remember Franklin and his many high positions in life!—a great philosopher, statesman and speaker. It was he, who in his unquenchable zeal for discovery, experimented with the lightning, and made a grand discovery relating to

the connection of the electrical fluid with the earth. Many were disposed to ridicule him, and when he asked various ones to help him with the experiment they declined, through fear of the consequences; but he finally secured the assistance of a boy, who accompanied him out in a severe thunder storm, and helped with the experiment. The apparatus consisted of a jar, a door key and a large silken kite which was raised, and attached to a silk thread. The kite, owing to its contact with the lightning became charged with electricity, and after a time when Franklin touched his finger to the key a spark was seen accompanied by a sharp crack. Doubtless it alarmed the lad, but being employed, he most likely stood his ground untill the suspicious business was over. Franklin retired, satisfied that he was successful.

The mysteries of nature are wonderful, curious, unsearchable; and although much has been discovered and apparently solved, yet there remains a vast amount hidden from man's wisdom.

We are indebted to the wasp for the first rudiments of paper making, which has been improved upon until the present mode of making it has been adopted. The wasp's actions when preparing the material for her nest are worthy of notice.

We will now leave the things which have been invented and builded by man, and make a short visit to those already formed by nature. One of the most striking in the United States, or the world, is the Natural Bridge in Rockbridge County, Virginia, which from

its formation and beauty is an object of great interest. According to history the dimensions of this great natural arch of rock are as follows: height 215 feet, width 100 feet, and span 90 feet. It approaches Niagara in grandeur, and surpasses it in height and mystery. Its composition is of limestone, of several shades. The walls appear as if cut with chisels. When one descends into the regions beneath the arch he is apt to be taken by a sense of the great mystery and quietude, and cannot help admiring its mystic creation and the Author thereof. The story of its erection has never been told and around its dignified form no traces of human skill or art are found, but all the work was accomplished by nature, unequaled, defying imitation. Whether formed by some great convulsion or slow wearing of waters, or from some other cause, we know not; but we see that it has the appearance of Infinite design, and all the perfection of plan and purpose. Around it are numerous babbling streams which are spanned by masses of rock which lodged when falling. The bridge connects two of the five round-topped mountains. On it in elevated positions are the names of those who wished to immortalize their being there. Many are the deeds of daring happenings which have occurred here. A short distance from the bridge is a beautiful glen where Cedar Creek makes a handsome leap over what is called Lace-Water Falls. Those who wish to see nature in her unsurpassed magnificence should visit the bridge.

Behold the Natural Bridge,
Whose gigantic walls of stone
Are towering Heavenward;

And on whose summit the stately oaks and Arborvitæ
 Are mingling their branches with the clouds.
 In the yawning space beneath it,
 All objects appear in miniature;
 And the rippling waters of Cedar Creek,
 Fill the wild and mysterious glen,
 With murmuring echoes and sweet vibrations.
 Here are five of Virginia's mountains,
 Two of which it spans, while below the arch,
 Nodding with every gentle breeze,
 Are delicate plants and flowers,
 Hanging from the fissures in the wall,
 No earthly architect its sacred plans arranged,
 No artists brush or pencil its form or color gave,
 No band of Workmen round it thronged;
 The work was done by Nature,
 And stands in glorious sublimity,

—*Berton Mercer.*

Next ranks Niagara Falls among the great wonders
 of American scenery, and here hundreds of people have
 traveled to witness the grand tumbling of her crystal
 waters, which at the bottom of the cliff are enshrouded
 in dense masses of vapor or tinted mist. On one
 side is Canada, on the other the northern states of
 the Union, or American side as it is usually called.
 This grand queen of water falls, together with the
 Thousand Isles and other beauties of the St. Lawrence
 river form a wild, mysterious grotesque scenery which
 defies expression by the most lively pen. There are
 many other falls which are beautiful, in various states,
 but all lack the supreme dignity of their Leader.

The Hudson and the great Lakes have their alluring
 charms and attractions. It is said the lakes contain
 more than half the fresh water upon the globe. The
 mountains, rivers, lakes, water-falls and caves are places
 of great enjoyment, and where you can hold heart-felt
 communion with the Author.

Of the underground mysteries the Mammoth Cave ranks first. It is situated in the state of Kentucky, and is an object of great interest. There are also many others in the world, but this is the most remarkable one. This cave is said to have been explored ten miles from the mouth, thus proving it to be no small opening in the ground. In it hang, in all kinds of beautiful designs, lovely formations of stone, resembling plants, flowers, ferns, etc. There are a number of rooms or chambers which have been named in accordance with their appearance or form—the impression they made upon the minds of those who viewed them. Endless and enchanting are the views within, and the many curious objects it exhibits.

Luray Cave ranks among the foremost of importance to visitors, and Watkins Glen is a place of marvelous beauty. Here may be seen Rainbow Falls, the name of which is sufficient to give some idea of their appearance. This deep gorge is supplied with a series of steps by means of which visitors can descend between the huge rocks and beautiful falls at pleasure, and absorb the magnificence of the scene as far as he is able. Not only upon the surface of the earth do we find these luxurious abodes, but many exist under ground. Go where you will, you are always met by some remarkable freak of nature. In the mountains they are there, and in the valleys you are conscious of their presence, and go to the uttermost parts of the earth, behold they are there.

Speak, oh Cave, oh mysterious cavern,
 Come reveal to me thy story;
 Whence camest thou with thy glossy turrets,
 And rugged suspended pinnacles, from whose points

The clear interior waters trickle in little drops?
 Did some fairy hand create thee,
 And give those resplendent beauties and hues,
 Which decorate thy domes and walls?
 We cannot fathom thy mysteries,
 No one saw thee formed.

Lost in silent thought and meditation
 We gaze upon thee with profound admiration.

—*B. Mercer.*

It seems from histories, litter, and the experiences of travelers and visitors who have viewed these places, and taken lasting observations from that, a general feeling of mysterious awe prevails among them; and the impressions sealed upon their memories of their feelings and thoughts at the time are never to be erased while living. There are many other natural curiosities over the world in every part which are beautiful and interesting, although they are not so well known or popular. Yet they aid in filling out nature's list, and could they speak would have many pleasant stories to tell.

FROST AND ITS EFFECTS.

Frost is a very silent worker, as well as a powerful one. When autumn is far spent and winter is drawing near, the first appearance of frost is as a snowy covering over everything. It appears very much like a light snow, and when the snow comes out it is seen rising as vapor from the roofs of buildings. Every boy knows one thing about frost; that is that it opens chestnut burs and causes the ripe nuts to fall out. Later in the season the frost comes harder and is known as black frost, and makes all vegetation snap and crackle when trampled on. The ground now becomes very hard and

doors and shutters report with loud noises. Especially is this the case when there is snow on the ground. In winter how curious are the crystals and formations seen on road banks and other places exposed to the sun. The ground is raised in a wonderful way, and looks as if it were supported on numerous icy pillars and supports. Frost during the cold season raises nearly all the fences and light buildings a considerable distance. It is wonderful what power it has. It makes no show, but accomplishes its work in silence. What handsome pictures does this element produce upon the windows of our houses! What beautiful wheat sheaves and delicate ferns, and fairy like plants of various formations! They are accurately formed, and show a better appearance than any drawn by artists' brush or pencil, and all of pure ice or frozen moisture. It seems curious, but the predominating features of these pictures are, they always resemble the wheat sheaf or fern formations. Let us look for jack-frost to come every winter and decorate our window panes.

The following lines were written by one of our poetical writers in regard to frost pictures.

Pictures on the window,
 Painted by Jack Frost,
 Coming at the midnight,
 With the moon are lost.
 Here a row of fir trees,
 Standing straight and tall;
 There a rapid river
 And a water-fall.
 Here a branch of coral,
 From the briny sea;
 There a weary traveler
 Resting 'neath a tree.
 Here a swamp all tangled,
 Rushes, cane and brake;
 There a rugged mountain,
 Here a little lake.

A SHORT ACCOUNT OF AUDUBON.

As the little volume in preparation is a friend of the naturalist, it will not be amiss to give a short and fleeting sketch of this great man, who lived and died praising nature's manifold works. From early boyhood he had longing desires to ramble through fields and woodlands, there to find out all he could, and learn by heart what he saw. His greatest wish was to have published an account of all he saw and heard in these wild haunts. He also wanted to have his work illustrated by engravings and pictures of the many creatures he saw. For this great end he dedicated his whole life and time. During the early part of his life he was at times under great doubt and discouragement as to the success of his project, but being animated by a desire to conquer, and at times being animated with hope, he pushed forward with a zeal which the determined only possess. He traveled from one state to another, thoroughly beating the country as he went. What made it worse for him he had no friends in these wild regions to console or shelter him, in consequence of which he suffered many hardships and exposures, but supported by his fervent wish and intense desire he bore up the best he could and wandered on. Many a time he lived and slept in the woods for weeks at a time, with no companions but his horse and dog—two faithful animals in which he placed great confidence; and many were the tempests and even hurricanes that passed over these three friends in those wild and cheerless regions of swamp and thicket.

In the course of time he married, but this relationship did not deter him from pursuing his labors, but he roved over the Union at large, and was absent from his home months at a time; but he was not careless or inattentive to home duties. The people of his neighborhood thought him almost out of his mind for living such a life, and he did not receive much help or encouragement from any of them. But being his own boss, and a man of a strong mind, he conquered their prejudices and continued his vocation, fulfilling the mission which seemed to be meeted out for him.

He always carried a gun, by which he secured specimens. Many times did he despair of reaching his project, but he was not easily daunted, for he had the spirit of pluck and perseverance, which led all great men to distinction.

He visited Europe and made extensive travels through that country, gathering information and making many friends, which quite encouraged him, and he pressed on with renewed energy, but he longed once more to see the wild and luxurious shores of America, and to rove in her forests, in which his chief delight lay. He soon returned and was greeted with more attention than he had anticipated from the people of Boston.

About this time he received a visit from Alexander Wilson, another noted naturalist. After working on with ceaseless toil for several more years, he again visited England, where he was warmly received by his old acquaintances. By the aid of one of his friends he was elected a member of one of the societies of Natural Sciences, which greatly helped him. He now engaged himself in getting subscribers for his works, and the

people began to be impatient to receive them. At least the first volume came before the public, which gave general satisfaction, and a thirst for more. One by one the books came out until the whole set had made its appearance. Thus our worthy hero Audubon was at last crowned with victory, and had the pleasure of seeing the work of his lifetime accomplished as he desired it. The last days of his life were spent in quiet enjoyment. He died in the year 1851. This short account does not embrace half of what his life was, but is briefly gleaned and composed from his Biography.

THE COMING OF SPRING.

Spring has come, and everything is fast growing into a state of new life and activity. The cold icy bands of winter have been broken asunder, and nature is rapidly regaining her summer beauty. Birds, which are the earliest representatives of the season have already winged their way from the sunny south, and have come once again to take up their abode with us for a short time.

They are flying around buisiness in their search for food and filling the woodlands and plains with the sweet sounds of their carols.

The trees, being animated with that natural life which stimulates them at this time of the year, are putting forth their leaves, bursting open the tiny velvet sheath which sheltered them from the blasting winds of the past winter. Also the little flowers which we delight to gather in the spring are awakening from their long slumber under the leaves.

Some of them which are bolder than others have already put forth their delicate blossoms to cheer us and tell us that more are coming soon. The snow-drop, for instance, has hung out its white bells, which have little tappers but they never ring. The trailing arbutus also has made its appearance to the great delight of those who search for it or are lovers of such things.

The grass of the field has regained its color, and broad expanses of sylvan green may be seen, giving a feeling of admiration to the beholder. The little stream which has been bound by the wintry king, is again free, and is leaping along its course, and bathing the golden sands, and grinding the little pebbles which have already become smooth by the long familiar ripple of the brook. The light winds and gentle showers are making glad the landscape, and fast bringing back the bright coloring and beautiful scenery of the country. It puts us in mind of the old saying: "April showers bring May flowers", which is true. The warm genial rays of the sun, the mild placidness of the sky, and the soft balmy air, fills us with the same life and joy it gives to surrounding objects.

See! The blossoms are out, and the atmosphere is filled with their sweet odors. Look at that beautiful orchard, all covered and enshrouded in white and pink flowers, and hear those little warblers chatting to each other in soft tones as they pass up and down the branches in search of insects. The maples too, have caught the warming rays of the sun, and are crowned with red and yellow blossoms, and among them the

ceasless hum of bees is heard, they having come to partake of the sweet contents of tiny cups.

The animals which have been lying dormant during the cold season, have aroused themselves from slumber and are coming forth to enjoy the change; and butterflies which have been shut up in cocoons now eat their way through their prison-houses and wing their way through the bright sunshine. The wild geese have been disturbed by natural instinct and are making their angular marches northward, where they spend the summer. In this way, one by one, our old friends return to us, each in their respective seasons, some more delicate than others, wait till everything is warmed and brightened up; while others return e'er the snow and ice have departed.

Now is the time of activity among people as well as other things. Now is the time that fruit is beginning to form, and the grains and grasses begin their growth; the wheat which has laid quiet under the snow, begins new action, and when the summer months arrive the fields appear like waving oceans sending huge ripples across them, till they reach the edge, and then cease.

In process of time, early fruits are ripening, the grass is coming into bloom and maturity, and the corn and other grains are rapidly progressing, and all the southern visitors of the woods and field have arrived, and merry spring with a quiet unconscious motion, yet perceptible changes, silently verges into mid-summer.

Oh, how my heart rejoices,
At the coming of the springtime,
With her happy voices,
More than in winter,

With its snow clad hills;
 More than in autumn,
 With its crimson leaves,
 More than in summer,
 With its gurgling rills.
 The air is filled with rich melodies,
 And sweet voices of love,
 The warbling of God's creatures,
 As they rove below; above.

—*B. Mercer.*

ANECDOTES OF NATURE.

A true story is told concerning a southern pirate of the worst class. It states that while on one of his robbing expeditions he had occasion from some cause to remain quiet for a period, when his attention was attracted by the gentle cooings of a Florida dove. At first he did not regard it as anything attractive, but as the sweet tones continued it awakened in his stony heart feelings which for many years had lain dormant, and he began to think, and became tendered. He mused upon the home where he was once happy, and the teachings which he received there, and he concluded to abandon the wicked traffic he was engaged in, and returned to his home, afterwards becoming a good pious man. So we see what good that little dove did for him, for by its loving notes he was led to repent and return.

The account of the insects which were sent into Egypt at the time of the plagues is very interesting, and may be read by all from the sacred volume. They were locusts and house-flies, and came in such overwhelming swarms as to nearly drive the inhabitants from the land. Also after the departure of the children of Israel, how that when they were in the wild desert,

their lives at stake by reason of hunger, the quails came in innumerable flocks and were easily caught and served for meat.

Remember the ravens bringing the prophet food when he was in the valley by the stream, how he (Elijah), listened morning and evening for the flapping of their wings, and received that which they brought him.

An interesting story is told in one of our reading books of a family who were taken captive by some Indians, and led away through the deep forest at no slow rate of speed, and when any would show signs of fatigue they were beaten by the savages to make them go on. At last one of their number became entirely dragged down and sank upon the ground, and the rest of the party proceeded at a rapid pace and were soon beyond sight and hearing. After some time the poor captive revived a little, and her first thoughts were, how or by what means could she overtake or find the rest of them. While in this musing state she noticed a little woods bird flitting around her, and she concluded to follow its flite, and did so and was conducted correctly to the spot where they were. Whether they were ever enabled to return to their homes or not I do not remember.

A very amusing story is related of some persons who exploring the Arctic regions. One day while wandering over the cold wastes they saw a moose, (a species of deer), feeding on a hillside not far distant, and resolving to procure him for food, fired from one of their rifles. The shot had no effect, the moose continued to eat. A second and third time they fired at him, but with the same effect. The guns were examined and

found to be all right. It was very strange. Finally one of them discovered that they had seen the animal through a transparent iceberg, and that they had been wasting their bullets against the same.

Nature is spoken of in many different ways and places. In the Bible reference is made to her or some of her works in an attractive manner. Some such passages have already been inserted within these pages.

The references by poets are many and beautiful. In regard to the love of Nature, Bryant says:

"To him who in the love of nature,
Holds communion with her visible forms,
She speaks a various language; for his gayer hours;
She has a voice of gladness, and a smile,
And eloquence of beauty, and she glides
Into his darker musings with a mild,
And gentle sympathy, that steals away
Their sharpness, ere he is aware."

Again we have a few lines from one of our poets,

"The bird that soars on highest wing,
Builds on the ground her lowly nest,
And she that doth most sweetly sing,
Sings in the shade where all things rest.
In lark and nightingale we see,
What honor hath humility,"

And again,

"There is pleasure in the pathless woods,
There is rapture on the lonely shore;
There is society where none intrudes;
But the deep sea, and music in its roar:
I love not man the less; but nature more
From these our interviews, in which I steal,
From what I may be or have been before,
To mingle with the Universe, and feel
What I cannot express; yet cannot all conceal."

From "The Brook," by Alfred Tennyson,

"I steal by lawns and grassy plots,
I slide by hazel covers,
I move the sweet forget me-nots,
That grow for happy lovers.

I slip, I slide, I gleam, I glance,
 Among my skimming swallows,
 I make the nettled sunbeam dance,
 Against the sandy shallows.

I murmur under moon and stars,
 In brambly wildernesses,
 I linger by my shingly bars,
 I loiter round my cresses.

And out again I curve and flow,
 To join the brimming river,
 For men may come and men may go,
 But I go on forever."

From another we have the following:

"Theres not a tint that paints the rose,
 Or decks the lily fair,
 Or streaks the humblest flower that grows,
 But Heaven has placed it there.

There's not a place in Earth's vast round,
 In ocean deep or air,
 Where skill and wisdom are not found,
 For Christ is everywhere.

In regard to the wilful slaughter of animals or any of the creatures found upon the earth, Cowper says:

I would not enter upon my list of friends,
 The man—though possessed of polished manners and
 fine sense—
 Who needlessly sets his foot upon a worm.

From "The Task."

He also adds that where these creatures prove of disadvantage in any way, or are required for food we have a right to slay them, but not otherwise.

BIRDS OF THE BIBLE.

As most of these birds have been described in the first part of this book. Their names and the passages relating to them will alone be given here. They are as follows: raven, bittern crane, owl, swallow, ostrich,

stork, eagle and quail. Their connection with Bible history is very interesting. Some have saved human life, others are spoken of as inhabiting ruined cities and desolate landscapes. Others again are spoken of as knowing the time of their coming. Quotations respecting them are as follows:

"The ravens brought him bread and flesh in the morning, and bread and flesh in the evening."—*I. Kings* XVII. 6.

"I will also make it a possession for the bittern and pools of water.—*Isaiah* XIV. 26.

"The turtle and the crane, and the swallow observe the time of their coming."—*Jeremiah* VIII. 7.

"There shall the great owl make her nest."—*Isa.* XXXIV. 15.

"The swallow hath found a nest for herself."—*Ps.* LXXXIV. 3

"What time she lifteth herself up on high, she scorneth the horse and his rider."—*Job* XXXIX. 18.

"Yes the stork in heaven knoweth her appointed time."—*Jeremiah* VIII. 7.

"As an eagle stirreth up her nest, fluttereth over her young."—*Deut.* XXXII. 11.

"There went forth a wind from the Lord and brought quails from the sea."—*Numbers* XI. 31.

These are a few quotations which we find in reference to these birds.

Supplement.

Now having treated upon birds, flowers and insects in a simple way, and in their homes and particular localities, and given a short historical sketch of each, we will leave them, hoping that the reader in looking over these pages, has had an interest awakened in him for the subjects here mentioned. Let the birds live in enjoyment and bliss in their neat homes, and the flowers bloom and blossom on the banks of their native stream, or in rich meadows, or barren wastes; and let the bee

continue its lazy hum, and the butterfly its flight, and all the other wonderful creatures which surround us pursue their daily occupations; and let us also visit and admire them, and make them a subject of our interest and study.

When tired down with labor, flee to nature in all her wild grandeur, and watch her children about their affairs; notice their habits, their food, their song, and many other things which were unseen and unknown before will now appear to you very glorious. When once interested in these things, new objects of beauty and attraction will be discovered at every ramble, and things and places which before appeared gloomy will be found to contain abundance of life and joy. Let the blind open their eyes and see, and let the past observer continue his search for new beauties, and his admiration for those already found.

With a strong love and recommendation for these dwellers of the woods, plains and water I close my brief remarks upon them, and proceed to notice other wondrous beauties of the natural world which are devoid of life, such as rainbows, halos, the clouds and sky, stars and planets, caves and glens, and many other things which are worthy of notice. Having treated upon each in a few words, but not undertaking to do justice to any, for that is beyond the power of man, we will also leave them as we did the living wonders.

Let Niagara continue her mighty thundering over the lofty precipice, from whose depth the troubled waters rise in clouds of vapor; and let the Natural bridge forever stand as a monument of divine architecture and beauty, over whose immense arch the people gaze in awe.

The caves of the earth which contain hidden treasures, let them remain in their dark chambers of solitude, to be a memorial of the great tumult and tempestuous condition of the earth in former times. And the stars continue their twinkling, and the planets in their stately revolutions, and the meteor his areal flight, and all the universe of wonderment in its perpetual and natural course; and with the same interest in these objects as was felt for those preceding, these few pages are concluded, with a desire that they may be of interest to others, and prove satisfactory to all.

FINIS.

ERRATA.

Page 4, first stanza, first line, for "loon" read *boon*.
4, second stanza, first line, for "look" read *book*.
42, 17th line for "snail" read *quail*.

INDEX.

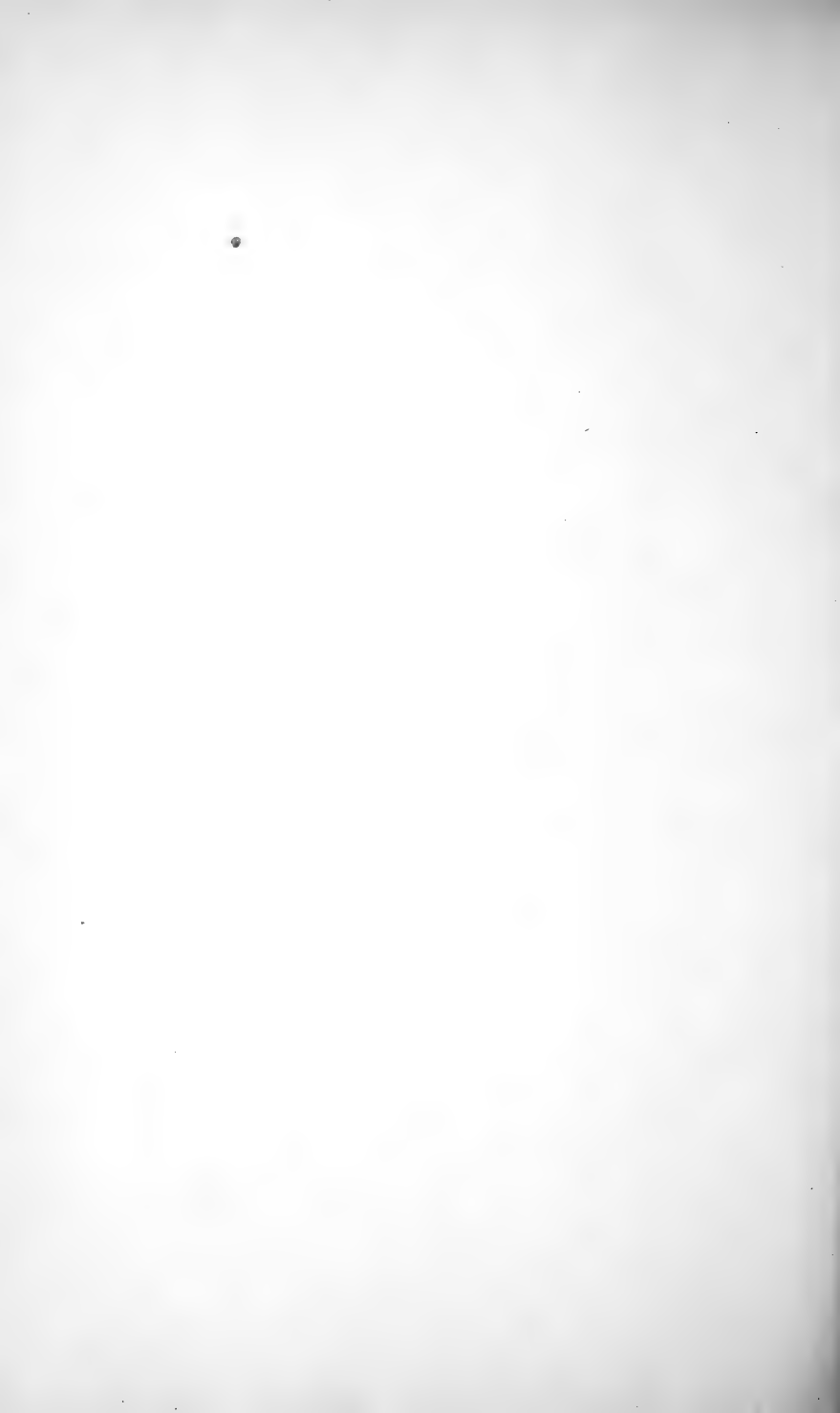
SUBJECT.	PAGE.
Salutatory Essay	3
Preface	7
PART I. Introduction to Birds	11
American Robin and Wood Thrush	13
Cat-bird and Mocking-bird	14
Green-crested Fly-catcher and Pine Finch	15
Golden crowned Thrush and Snowy Owl	16
White-eyed Vireo	17
Common Shrike and L. B. Marsh Wren	18
King-bird and Great-crested Flycatcher	19
Ruby-throated Humming bird	20
Pewee Fly-catcher and Wood Pewee	21
Chimney-swift and Whip-poor-will	22
Downy Woodpecker and Red-headed Woodpecker	23
Yellow-billed Cuckoo and Screech owl	24
High-hole Flicker and Kingfisher	25
Sparrow Hawk	26
Brown Thrush and Blue-bird	27
Ruby-crowned Kinglet and Blackcapped Chickadee	28
White-bellied Nuthatch and Brown creeper	29
House Wren	30
Scarlet Tanager and Chipping Sparrow	31
Field sparrow and Snow-bird	32
Chewink or Tohee and Cardinal Grosbeak	33
Indigo Bunting and Bobolink	34
Cow-bird and Swamp Blackbird	35
Meadow Lark and Orchard Oriole	36
Baltimore Oriole	37
American Crow and Blue Jay	38
Common Wagtail and Gold Finch	39
Maryland Yellow-throat and Yellow-breasted Chat	40
American Redstart and Red-eyed Vireo	41
Cedar Bird and Purple Martin	42
Warblers	43
Bald Eagle	45
Wild Goose	46
Red-tailed Hawk and Turkey Buzzard	47
Quail or Bobwhite and Green Heron	48
Mourning Dove and Ruffed Grouse	49
Killdeer and Common Tern	50
Our Winter Birds	51
Flight of the Birds	55
Dont Kill the Birds	56

SUBJECT.	PAGE.
PART II. Introduction to Plants	58
Pansy, Star Grass, and Trumpet Honeysuckle	59
Blue-eyed Grass, Wild Iris, and Sessile Belwort	60
Toadflax, Skullcap and Wild Phlox	61
Wild Honey-suckle, Lily of the Valley, Buttercup, etc.	62
Bellwort, Wild Geranium and May Flower	63
Quaker Ladies, Hawkweed and Yellow Violet	64
Tall Bellflower, Sheep Sorrel and Wild Columbine	65
Violets and Spring Beauty	66
Blood Root, Perawinkle and Mountain Pink	67
Liverwort Dog-wood Blossom and Anemone	68
Large Buttercup, Indian Turnip and Snow Drop	69
Jewel Weed and Wild Yellow Lily	70
Evening Primrose and Wild Rose	71
Lobelia and Trailing Arbutus	72
Monkey Flower and Wild Ginger	73
Autumnal Leaves and Grasses	74
Berries	76
The Composite Family of Flowers	78
The Uses of Plants	80
Reproduction of Plants	83
The Flowers	86
PART III. Introduction to Insects	88
Beetles	89
Bees and Wasps	92
Flies	98
Spiders	99
Ants	101
Scorpions	104
Butterflies and Worms	105
PART IV. Introduction to Animals	113
Rabbit	114
Opposum	115
Squirrels	116
Chipmunk or Ground Squirrel	119
Skunk and Fox	120
Ground Hog	121
Weasel and Muskrat	122
Mouse	123
Mole	124
Bat	125
The World Over	131
Divisions of the Animal Kingdom	133
Analysis of the Animal Kingdom	134
Observations	135
PART V. Natural Phenomena and changes	140
Rocks and Minerals	154
Solar System	161

SUBJECT.	PAGE.
Discoveries and Inventions	165
Frost and Its Effects	171
A Short Account of Audubon	173
The Coming of Spring	175
Anecdotes of Nature	178
Poetical Selections from other Authors	180
Birds of the Bible	181
Supplement	182

E. LAMBORN,
 PRINTER AND BINDER,
 EMPORIA, KANSAS.
 1889.













SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00314115 7

nh QH51.M55

The naturalist's companion /